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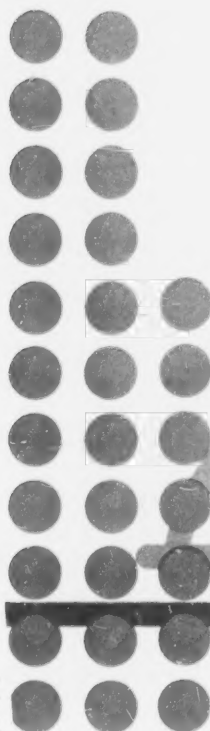
Family Planning

Perspectives

Volume 18, Number 5, September/October 1986

Interstate Differences in Teenage Pregnancy
The Public Costs of Teenage Childbearing

Contraceptive Failure Among U.S. Women

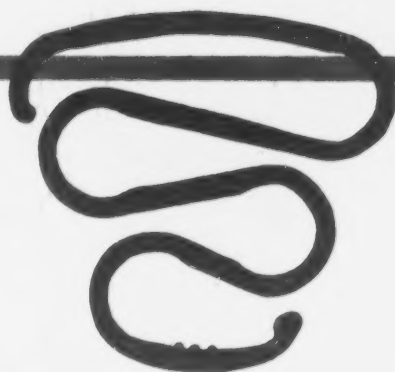


April 1986

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PD 21 JA 3738 P 1/1 86

on Administration, and How Supplied

DESCRIPTION

INDICATIONS AND USAGE

Loestrin Products are indicated for the prevention of pregnancy in women who elect to use oral Contraceptives.

Dose-related risk of thromboembolism from oral contraceptives: A study from the World Health Organization (WHO) found a positive association between the dose of estrogen in oral contraceptives and the risk of thromboembolism. The risk of a venous thromboembolism was 3.5 times greater in women taking 50 µg of estrogen compared with those taking 35 µg.

CONTRAINDICATIONS

- ## WARNINGS

The use of oral contraceptives is associated with an increased risk of several serious conditions including thromboembolism, stroke, myocardial infarction, hepatic adenoma, gallbladder disease, and hypertension. Practitioners prescribing oral contraceptives should be familiar with the following information regarding their risks.

- Cerebrovascular disorders:** In a prospective study in women with and without premenopausal diabetes it was suggested that the risk of cerebrovascular stroke was 30% lower in women that menstruated, and the risk of cerebrovascular stroke was 15% higher in women that did not.

Risk of dose: in an analysis of data from investigators, it was noted that the risk of thromboembolism, including coronary thrombosis, is directly related to the dose of oestrogen, and that oral contraceptives, however the quantity of oestrogen they contain, are a factor in the risk.

Estimate of excess mortality from circulatory diseases: The risk of diseases of the circulatory system is concentrated in older women, in those with a long duration of work, and in cigarette smokers.

been associated with the use of oral contraceptives. Discontinue the oral contraceptive if there is unexplained sudden or gradual partial or complete loss of vision, onset of photopsia or diplopia, papilledema or retinal vascular lesions.

of exogenous estrogen in postmenopausal women has been reported. However, there is no evidence suggesting increased risk of endometrial cancer in users of conventional combination or testosterone-only oral contraceptives.

There is no confirmed evidence of an increased risk of cancer in users of oral contraceptives. Close clinical surveillance of users is, nevertheless, essential. In cases of undiagnosed persistent or recurrent abnormal vaginal bleeding, appropriate diagnostic measures should be taken to rule out malignancy. Women with a current or history of breast cancer should not use oral contraceptives.

4. **Hepatic tumors:** benign hepatic adenoma have been found to be associated with oral contraceptives. Because hepatic adenomas may rupture and may cause death through intra-abdominal hemorrhage, they should be considered in women presenting abdominal pain and tenderness, abdominal mass, or shock.

5. **Usage in or Immediately Preceding Pregnancy.** Birth Defects in Offspring and Miscarriage in Female Offspring. During early pregnancy female sex hormones may seriously damage the offspring. It has been shown that females exposed in utero to diethylstilbestrol, a nonsteroid estrogen, have an increased risk of developing a rare form of vaginal cancer.

An increased risk of congenital anomalies, including heart defects and limb defects, has been associated with the use of oral contraceptives in women.

There is some evidence that triploidy and possibly other types of polyploidy are increased

PRECAUTIONS

1. A compatible medical and nursing facility should be prepared in the event of a fire, explosion, or other disaster and personnel should be adequately trained to respond to such

Drug interactions: Fluoxetine is affected by and affects the metabolism of many drugs. Fluoxetine may interact with other drugs that are metabolized by the same enzyme system, such as theophylline, tricyclic antidepressants, and oral contraceptives. Fluoxetine may also interact with other drugs that affect the central nervous system, such as alcohol, sedatives, and antipsychotics. Fluoxetine may also interact with other drugs that affect the cardiovascular system, such as beta-blockers and antiarrhythmics. Fluoxetine may also interact with other drugs that affect the immune system, such as immunosuppressants and vaccines. Fluoxetine may also interact with other drugs that affect the gastrointestinal system, such as antacids and laxatives. Fluoxetine may also interact with other drugs that affect the renal system, such as diuretics and nephrotoxic drugs. Fluoxetine may also interact with other drugs that affect the hepatic system, such as liver enzymes and liver disease. Fluoxetine may also interact with other drugs that affect the endocrine system, such as thyroid hormones and insulin. Fluoxetine may also interact with other drugs that affect the reproductive system, such as fertility drugs and birth control. Fluoxetine may also interact with other drugs that affect the nervous system, such as antiepileptics and anticholinergics. Fluoxetine may also interact with other drugs that affect the respiratory system, such as bronchodilators and corticosteroids. Fluoxetine may also interact with other drugs that affect the musculoskeletal system, such as muscle relaxants and painkillers. Fluoxetine may also interact with other drugs that affect the skin, such as topical anesthetics and skin irritants. Fluoxetine may also interact with other drugs that affect the eyes, such as eye drops and contact lenses. Fluoxetine may also interact with other drugs that affect the ears, nose, and throat, such as decongestants and antibiotics. Fluoxetine may also interact with other drugs that affect the urinary system, such as urinary antiseptics and diuretics. Fluoxetine may also interact with other drugs that affect the blood, such as anticoagulants and blood transfusions. Fluoxetine may also interact with other drugs that affect the immune system, such as immunosuppressants and vaccines. Fluoxetine may also interact with other drugs that affect the nervous system, such as antiepileptics and anticholinergics. Fluoxetine may also interact with other drugs that affect the respiratory system, such as bronchodilators and corticosteroids. Fluoxetine may also interact with other drugs that affect the musculoskeletal system, such as muscle relaxants and painkillers. Fluoxetine may also interact with other drugs that affect the skin, such as topical anesthetics and skin irritants. Fluoxetine may also interact with other drugs that affect the eyes, such as eye drops and contact lenses. Fluoxetine may also interact with other drugs that affect the ears, nose, and throat, such as decongestants and antibiotics. Fluoxetine may also interact with other drugs that affect the urinary system, such as urinary antiseptics and diuretics. Fluoxetine may also interact with other drugs that affect the blood, such as anticoagulants and blood transfusions.

Loestrin 21 Menstruation usually begins two or three days, but may begin as late as the fourth or fifth day after discontinuing medication.

confirm balance will require larger amounts of estrogen than that contained in one pill for a few cycles regularly. These patients experience atypical bleeding patterns, which do not conform to treatment schedules; it is important that patients adhere to the dosage schedule.

Loestrin **Fe** 1/20 is available in compacts each containing 21 white tablets and 7 brown tablets; each white tablet contains 1 mg of norgestrel and 20 mcg of ethinyl estradiol.

Loestrin **Fe** 1.5-30 is available in compacts each containing 21 green tablets and 7 brown

Caution—Federal law prohibits dispensing without prescription.

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Contraceptive Failure in the United States: Estimates from the 1982 National Survey Of Family Growth

By William R. Grady, Mark D. Hayward
and Junichi Yagi

Summary

A multivariate life-table analysis of national survey data from 1982 indicates that among currently married women, the pill and IUD have the lowest use-failure rates. During the first year of use, about three percent of pill users and six percent of IUD users experience an unintended pregnancy. Failure rates for the remaining methods range from 14 percent for the condom to 22 percent for spermicides; between these lie rhythm and natural family planning (16 percent), the diaphragm (17 percent) and other methods, mainly withdrawal, douche and abstinence. Married women using no contraceptive method experience an unintended pregnancy rate of 40 percent during the first year of unprotected intercourse.

A woman's age, pregnancy intention (either to delay or to prevent births), parity and income all have significant effects on the risk of unintended pregnancy. The risk generally declines with age, except for women attempting to prevent an unwanted pregnancy, among whom women under 20 have lower failure rates than do those 20–29 years of age. As expected, women attempting to prevent an unwanted pregnancy have lower failure rates than do those seeking to delay a wanted pregnancy, with the difference being greatest for women under 20 years of age and smallest for 20–29-year-olds. Use-failure rates among low-income women are higher than those among women with larger family incomes, while low-parity women have lower failure rates than do women of higher parity.

On average, standardized use-failure rates for single women are lower than those for married women, probably because of a lower average level of intercourse among single women. In addition, these rates are understated because of the substantial underreporting of abortion among single women; if abortion reporting were complete, failure rates would be about 1.4 times as high as they appear here, and thus

would be close to those of married women. Differences in the risk of unintended pregnancy among single women show a number of similarities with those seen among married women: Use of the pill and IUD is associated with the lowest failure rates, reliance on the condom is associated with intermediate failure rates, and use of spermicides is linked with the highest failure rates. However, while rhythm and the diaphragm exhibit use-failure rates that are among the highest found for single women, failure rates for these methods are at intermediate levels among married women. Another exception is for "other" methods, for which use-failure rates are intermediate among single women but very high among married women. One-third of single women who use no contraceptive method have an unintended pregnancy during the first year of unprotected intercourse. The overall effects of family income and parity are consistent among married and single women, but the effects of age, race and contraceptive intention differ.

Measuring Contraceptive Effectiveness

In their original analysis of contraceptive failure rates calculated from the 1973 and 1976 National Surveys of Family Growth (NSFG), Allen L. Schirm and his colleagues claimed that "strictly speaking, the effectiveness of a method is the *reduction* its use brings to the risk or probability of conception when no method is used."¹ Thus, to determine the true effectiveness of a particular method, the risk of accidental pregnancy during its use should be compared with the risk associated with the use of no method. While this comparison may seem simple, the risk related to the use of no method cannot be readily determined, since women may be using no method because of subfecundity or very low coital frequency, to suggest just two reasons. As a result, earlier research in this area has concentrated on the rate or probability of contraceptive failure; comparisons of such

rates for various methods of birth control provide at least an indicator of relative effectiveness.

Three types of failure rates have been of interest to researchers—theoretical, extended use-failure and use-failure rates. The theoretical rate is the rate prevailing if a method is used perfectly; its major problem, however, is that it is theoretical and cannot be derived from survey data. It also bears little relationship to failure rates of methods as they are actually used. The extended use-failure rate, in contrast, takes into account method failure, user failure and user loyalty; in this measure, women are assumed to be at risk of contraceptive failure during an entire pregnancy interval (except for periods of nonexposure), and unintended pregnancies are attributed to the failure of the first method used in that interval, regardless of whether that method was abandoned prior to conception. This measure, then, does not permit the identification of the risk of contraceptive failure during use. The use-failure rate, on the other hand, is a direct measure of this risk, and includes both user-related and method-related reasons for failure. This type of rate, which has been the focus of many previous studies,² can be determined from survey data, so the risk of unintended pregnancy during contraceptive use can be calculated for particular methods as they are actually employed.

When examining the failure rates reported here, we should keep two considerations in mind. First is that to the extent that women

William R. Grady and Mark D. Hayward are research scientists and Junichi Yagi was a research specialist with the Battelle Human Affairs Research Centers, Seattle. This article is based on a study that was supported by the Office of Population Affairs, DHHS, under contract no. 282-83-0076. The opinions expressed herein are those of the authors and do not necessarily represent those of the Office of Population Affairs or the Battelle Memorial Institute. The authors wish to thank Jane Menken and an anonymous reviewer for their helpful comments, and David Sommers and Francesca Florey for their computational assistance.

who choose a particular contraceptive method are different from those who choose another, comparisons of failure rates by method will reflect a certain amount of self-selection. The effects of some differences between users of various methods (and between users and nonusers) can be controlled for by using multivariate statistical techniques. Other differences, in particular those involving fecundity and frequency of intercourse, cannot be controlled for, and may affect the comparisons insofar as they influence the choice of a method. A second, although probably less important, consideration concerns the possibility that the adoption of a specific type of method may produce behavioral changes affecting exposure to the risk of pregnancy that are reflected in the failure rates, such as when the use of no method leads to a reduction in coital frequency, or when pill use leads to an increase in coital frequency.

Since 1973, research has provided increasingly more detailed information on the risks of unplanned pregnancy associated with different contraceptive methods and with various social, economic and demographic characteristics of married women in the United States practicing contraception.³ The Schirm study estimated use-failure rates using a hazards-model analysis.⁴ This approach is a multivariate technique that allows the estimation of independent effects on the risk (or hazard) of contraceptive use-failure for each variable included in the model. Using this approach, rates can be calculated for any combination of characteristics in the model, and failure rates that are standardized for the other variables can also be calculated for each category of any variable. The analysis used here is a direct extension of this earlier work, employing the same methodology but based on Cycle III of the NSFG (NSFG-III), which was conducted in 1982. It is also the first analysis to measure the risk of unintended pregnancy among married women during periods in which they use no method.

No previous research has examined contraceptive failure among a sample representative of all single women in the United States. Although some research on single adolescent women has been undertaken, it is severely limited in scope, having been restricted to never-married women 18-19 years of age.⁵ In addition, because of problems with the availability of data, these analyses, which are limited to examination of rates of unintended pregnancy by duration since either first intercourse or first method use, do not provide true life-table probabilities (i.e., risks of unintended pregnancy), since one cannot determine whether the respondents actually engaged in coitus subsequent to the first month of observation.

Thus, since the at-risk population cannot be adequately identified, unintended pregnancy rates among single women only approximate extended use-failure rates and cannot be directly compared with rates for married women, among whom nonexposure to intercourse has been controlled for. Comparability by marital status is also limited by the fact that the studies involving single women aged 18-19 restricted their analyses to the first pregnancy interval (from first coitus to either first marriage or first pregnancy).

Despite their problems of comparability and representativeness, these early studies of contraceptive effectiveness among never-married women do find substantial differences in the risk of contraceptive failure by type of method first used, and they show large reductions in the risk of unintended pregnancy when use of the pill or IUD is compared with use of no method. Unfortunately, the life-table methodology that was used was not a multivariate technique, and control variables could not be introduced into the analyses. However, separate life table analyses for blacks and whites and for different ages at first intercourse showed that these characteristics were associated with significant differences in the risk of unintended pregnancy.

This article addresses the problems encountered in earlier studies of single women. First, the study described here is representative of the experiences of all single women, not of a selected subsample. Second, it produces use-failure rates based on life-table analysis, since information from the NSFG-III permits the risk of unintended pregnancy to be ascertained for each month of exposure. Finally, the multivariate hazards-model life table that is used permits, for the first time, examination of the independent effects both of type of method and of individual characteristics on the risk of unintended pregnancy among single women.

Researchers have asserted that data on contraceptive use among teenagers contain a "large element of error because of the respondent's inability or unwillingness to recall past use accurately."⁶ However, this conclusion is based on conflicts between the respondents' claims that they used a method continuously and their admissions that they sometimes "skipped" using it. In the present analysis, however, "continuous use" is considered simply as reliance over a specified duration, whether or not use was sometimes skipped. In general, the quality of data for single women was comparable to that of married women in the NSFG-III: There was no significantly greater level of missing or inconsistent data among single women's responses, and the number of periods without

intercourse that were reported by never-married women was comparable to the number reported by married women, although never-married women tended to report longer periods of no intercourse.

One problem not addressed in previous research on contraceptive failure is the underreporting of abortion. When failure rates are based on survey data, any tendency for survey respondents not to report unintended pregnancies that ended in abortion negatively biases failure rates. The accuracy of abortion reporting among NSFG-III respondents has been estimated to vary with a woman's race and marital status.⁷ White married women reported nearly all of their pregnancies that ended in abortion, whereas black married women reported only an estimated 39 percent. Overall, married women reported an estimated 82 percent of their abortions, compared with 44 percent among single women. Reporting is estimated to be about 52 percent complete among single white women, while among single blacks it is believed to be only 34 percent complete.

It is difficult to estimate the effect of this underreporting on estimated failure rates, but it is clear that the use-failure rates reported for single women are too low here, as well as in previous research. The effect of underreporting is probably very small among married women but considerable among single women. The magnitude of abortion underreporting among single women has two implications for the results given here. First, the true level of risk of unintended pregnancy among single women is not accurately reflected in the estimated failure rates, thus, use-failure rates in this article for married and single women have been adjusted for the underreporting of abortion. However, these estimates presume that there are no method-related differences in the completeness of abortion reporting (an assumption required because of the lack of information about the magnitude of any such differences). Second, comparisons across subgroups of single women and between single and married women are affected by group differences in the completeness of abortion reporting. Any such comparisons, then, must be made with caution.

Methodology

Cycle III of the NSFG used a sample representative of all women aged 15-44 living in households or group quarters in the coterminous United States. It was the first survey to include detailed information on contraceptive use and sexual activity for a representative sample of never-married women. The survey employed a multistage area probability sample. Personal interviews averaging an

Table 1. Variables tested for inclusion in the hazards model

Variable	Category
Method	Pill/IUD/condom/diaphragm/ spermicides/rhythm/ other/none
Consistency of use	Never skipped/sometimes skipped/always skipped
Intention	Prevent/delay
Duration of exposure (in months)	1-2/3-4/5-6/7-8/9-10/ 11-12
Race	Black/other
Religion	Catholic/other/none
Annual family income (as % of poverty level)	< 100%/100%-199%/ 200%-299%/-300%
Parity at beginning of exposure interval	0/1-3/-4
Age at beginning of exposure interval	< 18/18-19/20-24/25-29/ 30-44
Marital status	Single/currently married

hour in length were completed with 7,969 women between July 1982 and February 1983. Black women and adolescents aged 15-19 were oversampled. Missing data codes for all variables included in the analysis and for variables used to construct a file of intervals of exposure were imputed.*

Exposure intervals, which form the foundation for this analysis, are based on very detailed information about each interval of continuous use of a contraceptive method, or each period of nonuse, during which the woman was exposed to the risk of pregnancy (i.e., she was having intercourse, not sterile and not trying to become pregnant). To be eligible for inclusion, the exposure interval must have occurred, at least in part, during the observation period—January 1, 1979, to July 1, 1982. Since each interval represents a period of continuous use or nonuse, women who switch methods or who switch between use and nonuse can contribute more than one interval to the study. Intervals that are interrupted by periods of no intercourse are considered continuous, but these periods contribute no exposure to the interval during that time.

The selection of the sample of exposure

intervals follows the procedures originally established in an analysis of Cycle-I NSFG data⁸ and modified for use with the Cycle-II analysis.⁹ Specific selection criteria are described in the appendix, as are methods both for determining the amount of exposure and for coding termination status for each interval. The final analysis is based on information for 5,269 women (66 percent of the respondents),† who contributed a total of 10,692 intervals of continuous exposure. For 1,687 intervals, the first month of observation started 12 or more months after the beginning of exposure, so these were deleted from the study. Thus, the analysis described here is based on a total of 8,922 exposure intervals—5,385 contributed by single women and 3,537 contributed by married women.

Each of the exposure intervals contains information about a number of user characteristics listed in Table 1. With the exception of duration of exposure and marital status, all characteristics refer to the user's status at the beginning of the interval. Marital status is a time-dependent covariate, so women who changed marital status during a segment of exposure are removed from one marital-status model and entered into the other during the ordinal month of exposure in which the transition occurred. Marriage is considered to begin with entry into formal marriage and end upon separation or widowhood. Thus, the models for married women represent the experiences of women who are currently married with spouse present, never-married and formerly married women are classified as single.

The log-linear hazards modeling technique used in this analysis permits the examination of the simultaneous effects of a large number of variables on the risk of contraceptive failure.‡ The model-fitting procedure used here is described on page 209 of the appendix. The model for married women controls for contraceptive method, duration of exposure, contraceptive intention (whether to delay or prevent a birth), age, parity and income. Duration of exposure is included in the model in order to establish the baseline hazard function needed to calculate life-table failure rates and is not of explicit substantive interest. In this study, however, interactions

of duration by type of method were found to be significant. § Race, religion and consistency of use (whether the woman ever skipped using the method) did not significantly affect the fit of the model, and were deleted from the analysis. The nonsignificant effects of race and religion were anticipated, given previous findings.¹⁰ However, the lack of significance for the consistency variable was surprising, since it is clear that skipping use of a contraceptive method should raise the risk of conception.

The lack of effect for the measure of consistency of use is probably due to poor measurement. Skipping may occur more frequently during periods in which a woman is at low risk of conception, indicating perhaps a periodic reliance on rhythm. Questions in the NSFG did not probe for this. The questionnaire also does not ask *when* skipping occurred during the segment of method use, thus, at least some proportion of married women who skipped using a method may have done so after the first 12 months of observed use, which are all that are included in this analysis. Finally, the skipping variable was classified into ambiguous categories of frequency (e.g., "sometimes" and "often") that have skewed distributions and may have greatly different meanings to users of different methods. Thus, we chose to collapse this variable into a dichotomy, which may obscure its true effects. An understanding of the actual effects of skipping the use of a method on the risk of contraceptive failure most likely must wait until a better measure of consistency of use is developed.

The model for single women controls for contraceptive method, duration of exposure, contraceptive intention, age, parity, income and race. Age and parity have nonproportional effects—their effects differ by duration of exposure. Consistent with the results for married women, religion and consistency of use did not contribute significantly to the fit of the statistical model and were deleted from the analysis. However, unlike the model for married women, the model for single women included race as a variable having a significant effect on the risk of unintended pregnancy.

In this analysis, standardized use-failure

*Some variables were imputed by the National Center for Health Statistics (NCHS), while others were imputed as part of this study. To accomplish this, the NCHS used imputation from a sorted file, while the authors of this article used a hot-deck procedure. For descriptions of both of these procedures, see B. Vaughan et al., 1980 (reference 2).

†The 2,700 women who were deleted experienced no exposure to the risk of unintended pregnancy during the entire observation period. Eighteen were premenarcheal at the close of observation, 1,259 were virgins at that time

and 1,159 were sterile for either contraceptive or noncontraceptive reasons at the beginning of observation. Another 264 women were excluded because during the entire observation period, they either did not have intercourse (including time spent prior to first intercourse), were trying to become pregnant, were pregnant, were in the postpartum period or were sterile.

‡Parameter estimates and standard errors for all variables in the life table are available from the authors.

§Schirm and his colleagues found that the effects of the

characteristics of users on failure rates (or hazard rates) were the same (or proportional) at all durations. In the research described here, since the effects of some characteristics were found to differ at various durations of method use (i.e., nonproportional effects were found), the calculation of failure rates is based on both proportional and nonproportional effects. A nonparametric contingency-table approach was used to estimate the hazards-model life table; thus, all covariates and durations are treated categorically. (For a more complete description of the hazards-model life table and the contingency-table method of estimation, see reference 1.)

Table 2. Percentage of currently married women who have an unplanned pregnancy within the first year of contraceptive use, by method, January 1, 1979–July 1, 1982

Method	Unstan- dard- ized	Stan- dard- ized*	Ad- justed†
Pill	3.7	2.9	2.9
IUD	7.1	5.9	6.0
Condom	10.6	13.8	14.1
Rhythm	8.6	16.1	16.1
Diaphragm	14.9	17.0	17.2
Spermicides	20.2	21.8	22.1
Other	22.9	21.7	21.9
No method	43.1	40.0	41.2

*Standardized for age, contraceptive intention, parity and income.

†Standardized for age, contraceptive intention, parity and income, and adjusted for underreporting of abortion.

rates are used to illustrate the effects of each characteristic.* Separate calculations were made for married and for single women, so that the standardized estimates shown for each marital-status group represent the experiences of all women of that marital status who were exposed to the risk of unintended pregnancy during the observation period. However, since the rates shown for each marital-status group were standardized separately, comparisons remain influenced by differences by marital status in women's characteristics.

Failure Rates Among Married Women

Table 2 shows unstandardized and standardized use-failure rates, by method, as well as use-failure rates that have been adjusted for the underreporting of abortion.† It is noteworthy that among married women, adjusting for abortion underreporting has a very small impact on failure rates. Standardized rates indicate that the pill and the IUD are the most effective contraceptive methods (with failure rates of three and six percent, respectively), followed by the condom (14 percent), rhythm (16 percent) and the diaphragm (17 percent).

Overall, the rates presented in Table 2 are slightly higher than those calculated by similar means in earlier research.¹¹ The increase is probably due mainly to the shift toward sterilization observed in recent years among married women who have completed their childbearing.¹² This trend has resulted in a younger age structure and a higher proportion of delayers among the nonsterile, currently married women who are under study.

Another difference between these results and those of previous research is the relatively low failure rate associated with use of the rhythm method, a rate substantially lower than that found in the analysis of 1973 and

1976 NSFG data (24 percent).¹³ It is possible that the educational efforts of natural family planning advocates have created a trend toward better use of this method. For example, the data indicate that rhythm users in the NSFG-III were more likely to report that they relied on the temperature method (as opposed to the calendar method) than were rhythm users in the NSFG-II (16 percent and 10 percent, respectively), however, both of these proportions are low, and the vast majority of rhythm users still report that they rely on the calendar method. Although these results offer an interesting departure from earlier findings, they must be interpreted with extreme caution. Only 6.3 percent of person-months of exposure were contributed by rhythm users. Thus, the use-failure rate found for this method is subject to a substantial amount of sampling error.

This study is the first to produce an estimate of the risk of unintended pregnancy during the first year associated with the use of no method. At first glance, the 40 percent risk found in Table 2 may seem low; it is certainly far below the biological maximum for this population. It should be remembered, however, that the women involved in this analysis are those who did not want to get pregnant. Thus, it is likely that their use of no method is associated with evidence of subfecundity or with a low level of coital frequency. Women may choose to use no method because they have intercourse infrequently, or they may restrict coital frequency because of the high risk of conception associated with unprotected intercourse. These women may also tend to engage in intercourse only during the relatively safe periods of their cycles and may therefore be practicing a form of periodic abstinence, or rhythm. Nevertheless, the failure rate reported here represents the actual experience of the population of currently married women who experience unprotected intercourse.

When the unstandardized rates are examined, we find that they are similar to the standardized rates. The largest percentage differences are found for the pill, IUD, condom and rhythm: The unstandardized rates for pill and IUD users (four percent and seven percent, respectively) are more than 20 percent higher than the standardized rates. These differences result from the fact that users of both of these methods tend to be younger and have lower incomes, characteristics that are associated with a high risk of unintended pregnancy. In addition, pill users are likely to be delaying a wanted pregnancy. In contrast, standardization increases the failure rate for the condom and rhythm (from 11 to 14 percent and from nine to 16 percent, respectively), because the users of

these methods are older and have higher incomes, characteristics associated with low risks of unintended pregnancy.

Failure rates standardized according to a woman's contraceptive intention and age are found in Table 3 (see page 204). The effects of these two factors are shown together because of the statistical interaction between intention and age. Overall, women who are trying to prevent an unwanted pregnancy have lower failure rates than those who are attempting to delay a wanted pregnancy. However, this difference is greatest among women younger than 20 and smallest among 20–29-year-olds. The results shown here are similar to those found in earlier research.¹⁴ However, the Schirm study found that young preventers had the highest failure rates of any age and intention group, while here such women appear to have the second lowest failure rates. The reason for this change is unclear, but it may be partly the result of different age-categorizations in the two studies. The youngest age-group in the earlier study included all women under age 22, while the current study restricts the youngest age-group to women under age 20.

The reason for the relationship between a woman's age and her contraceptive intention may be found in the costs of having another child. Among delayers, who do want a child at some time, these costs are unrelated to age. However, for preventers, an unwanted child would have an increasingly greater impact as they become older and enter later stages of the family life-cycle. Anticipation of this impact may increase their motivation to avoid an unintended pregnancy. Women younger than 20 who seek to prevent another birth are an unusual group in that they com-

*Standardization is accomplished by calculating one-year method-failure rates for each combination of characteristics included in the model, calculating the proportion of exposure that is observed within each cell defined by these characteristics, for all method users combined, and then taking the weighted average of the failure rates within each method category, using the proportions found in the previous step as the weights. Since the same marginal distributions (for all methods) are used to obtain the weighted average for each type of method, the resulting standardized use-failure rates are those that would occur in the absence of method differences in the characteristics of users. The resulting rates are similar to adjusted rates that are obtained in the more familiar types of multiple classification analysis.

†The adjustment for underreporting of abortions by NSFG-III respondents used the following formula:

$$\hat{f}_e = f_e \times [1 - p_a + (p_a/p_r)]$$

where $\hat{f}_e$ is the adjusted failure rate, f_e is the estimated failure rate, p_a is the proportion of respondents who reported that a pregnancy resulting from a contraceptive failure ended in an induced abortion and p_r is the proportion of actual abortions reported by NSFG-III respondents (as estimated in reference 7).

Table 3. Percentage of currently married women who have an unplanned pregnancy within the first year of contraceptive use, by contraceptive intention and age, by parity and by income, according to method

Variable	Pill	IUD	Rhythm	Condom	Diaphragm	Spermicides	Other	No method
INTENTION AND AGE*								
Delay								
<20	4.7	9.5	85.6	21.7	26.5	33.4	33.2	57.4
20-24	3.7	7.7	10.1	17.7	21.8	27.8	27.6	49.5
25-29	2.8	5.7	11.7	13.4	16.6	21.4	21.2	39.7
30-44	2.8	5.9	15.4	13.8	17.1	21.9	21.8	40.6
Prevent								
<20	1.6	(3.3)	(48.9)	7.9	9.9	(12.9)	(12.8)	25.2
20-24	3.3	6.9	9.1	16.0	19.8	25.2	25.1	45.7
25-29	2.4	4.9	10.1	11.7	14.5	18.7	18.6	35.4
30-44	1.2	2.6	7.0	6.3	7.9	10.3	10.2	20.4
PARITY†								
0	2.6	5.4	15.2	12.7	15.8	20.2	20.1	37.4
1-3	2.9	5.9	16.2	13.9	17.2	22.0	21.8	40.2
≥4	4.1	8.3	20.5	19.1	23.4	29.5	29.3	51.1
INCOME‡								
<100%	4.1	8.5	21.0	19.5	23.9	30.2	30.0	52.4
100%-299%	3.1	6.3	17.1	14.8	18.3	23.4	23.3	42.7
≥300%	2.3	4.8	14.0	11.4	14.2	18.3	18.2	34.5

*Standardized by parity and income.

†Standardized by contraceptive intention, age and income.

‡As a percentage of the federally designated poverty level; standardized by contraceptive intention, age and parity.

Note. Parentheses signify that there are no intervals in cell (see Appendix, p. 209).

pleted their childbearing very early, and thus face a very long period of time during which they are at risk of having an unwanted child. This prospect may provide the additional motivation to avoid contraceptive failure that is reflected in their low failure rates.

Table 3 shows that the risk of unintended pregnancy increases with parity. This relationship is unexpected, in that it was not evident in previous research on married women.¹⁵ However, the association may result from two factors: High parity may be an indicator of previous contraceptive failure, so that high-parity women would tend to be less effective contraceptive users; an alternative explanation could be a difference in the marginal costs of having an unwanted child. For example, women with no children would find their lives substantially changed if they were to have a child, and thus may have an added motivation to avoid an unintended pregnancy; in contrast, the birth of another child might have a less dramatic impact for a woman with four children, since the family has already had to accommodate the needs of a number of children.

Income (measured as a percentage of the poverty level) is negatively related to the risk of unintended pregnancy. This may be because higher income women have greater access to information about contraception and reproduction; it may also be that such women feel they have greater control over all

aspects of their lives, including reproduction, and are less fatalistic about childbearing than are low-income women. Finally, the opportunity costs associated with having an unwanted child are probably greater for higher income women.

Failure Rates Among Single Women

Standardized contraceptive failure rates for single women are found in Table 4. The pattern of these rates is similar to that seen among married women. For example, just as with married women, single women using the pill and IUD have the lowest failure rates (4-5 percent), use of the condom is associated with intermediate failure rates (eight percent) and a high failure rate is found among users of spermicides (16 percent). In contrast to what was seen among married women, the unmarried who rely on rhythm and the diaphragm experience relatively high failure rates, approximately the same as the rate associated with spermicide use. Another divergence from the pattern observed among married women is the relatively low failure rate for "other" methods (primarily douche, withdrawal and abstinence). The reason for this difference is unknown, since married and single women are about as likely to rely on each of these methods; however, single women using "other" methods are slightly more likely than married women to have relied on abstinence (eight percent compared

with five percent). Among single women who use no method, the risk of pregnancy during the first year of exposure is 33 percent.

In general, there are smaller differences between the unstandardized and standardized rates for single women than there were for married women. The largest differences are found for the IUD, rhythm and "other" methods. The reason that users of the IUD and rhythm have substantially lower failure rates after standardization is that users of these methods tend to be of high parity and to have a low income, characteristics that are associated with a high risk of failure. Single women who use rhythm are also younger than other users. Those who rely on "other" methods, in contrast, tend to be of lower parity and to have a higher income.

Overall, the failure rates estimated for single women are lower than comparable rates found for married women, only the failure rate for the pill is higher. However, as was noted above, these rates are underestimates because of the substantial underreporting of abortions among single respondents to the NSFG-III. Table 4 shows that when failure rates have been adjusted for abortion underreporting, they average about 44 percent higher than the unadjusted rates, and are much closer to the rates of married women. Indeed, the adjusted rates for use of the pill, rhythm, the diaphragm and no method are higher than comparable rates for married women. The higher rates for rhythm and the diaphragm may be due to their coitus-intrusive nature, which is perhaps less compatible with single women's life-styles. The higher rates for use of the pill and no method are less easily understood. It may be that single women are more prone to skip the pill when they are not regularly exposed to intercourse, and thus they use it less effectively; single women who use no method may simply be greater

(Continued on page 207)

Table 4. Percentage of single women who have an unplanned pregnancy within the first year of contraceptive use, by method

Method	Unstandardized	Standardized*	Adjusted†
Pill	5.3	4.6	5.7
IUD	7.6	4.4	5.4
Condom	8.2	8.0	10.8
Rhythm	20.6	15.8	23.0
Diaphragm	13.3	14.4	23.3
Spermicides	17.1	15.6	19.4
Other	7.5	9.2	15.4
No method	33.9	33.4	44.7

*Standardized for age, contraceptive intention, race, parity and income.

†Standardized for age, contraceptive intention, race, parity and income, and adjusted for underreporting of abortion.

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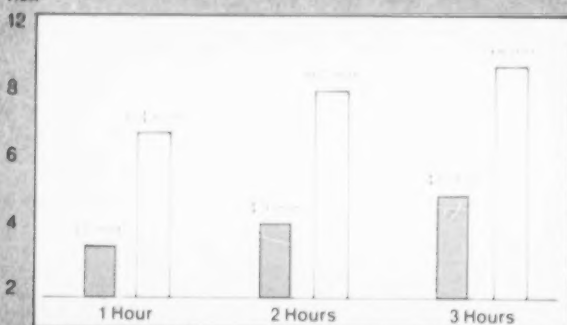
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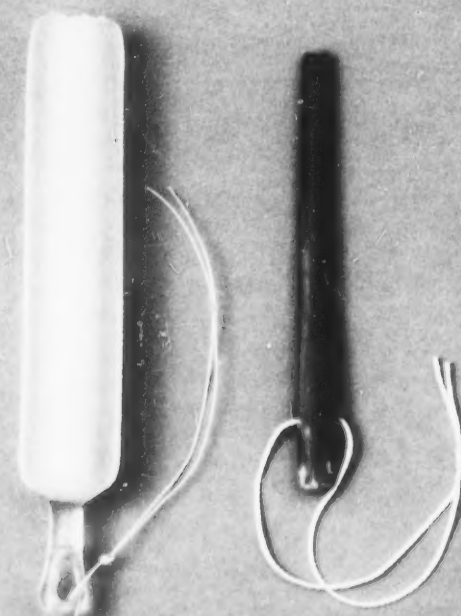
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2. Data on file, Gynotech Incorporated, Lebanon, NJ.

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(Continued from page 204)

risk-takers than comparable married women, or may be more fecund. However, while the adjustment for abortion underreporting takes into account method-related differences in the likelihood of terminating a contraceptive failure in an abortion, it assumes no such differences in the likelihood of reporting those abortions. These adjusted rates, then, must be interpreted with caution. In addition, single women are younger, have lower incomes and parities and are more likely to be delaying a birth than are married women. These differences are also reflected in the failure rates reported here, and will affect comparisons related to marital status.

As was seen for married women, the joint effect of the contraceptive intention and age of single women influences failure rates. In Table 5, we can see that the effect of contraceptive intention among single women is very different from that found among married women. Overall, single women who are delaying a wanted birth have lower failure rates than do those who are preventing an unwanted birth. This result is counterintuitive and cannot readily be explained. It may be that in retrospect, women redefine the childbearing intentions they had at the time of conception; for example, single women may experience so many negative consequences from an unintended pregnancy that they define that pregnancy as never wanted, regardless of their feelings at the time of conception. Since adverse consequences (e.g., disruption of schooling and conflict with parents) are likely to decline with age, this tendency toward redefinition may also account for the diminishing difference up to age 29, when the relationship between contraceptive intention and age reverses.

Another possible explanation is that young single women trying to prevent a pregnancy do so because they have already had one or more unwanted pregnancies. Thus, prevention (as opposed to delay) at a young age may be an indicator of previous contraceptive failure; this group, then, may include a high proportion of ineffective users and high-risk nonusers. The older age-groups, in contrast, may include many formerly married women who successfully regulated their fertility until they attained their desired family size.

The results in Table 5 show that black women and women of all other races have comparable risks of unintended pregnancy, except that among users of the rhythm method, blacks have substantially lower risks of unintended pregnancy than do other women. The reason for this lower risk is unknown, but it should be noted that this relationship is based on the experience of very few women. When considering the race-related differ-

Table 5. Percentage of single women who have an unplanned pregnancy within the first year of contraceptive use, by contraceptive intention and age, by race, by parity and by income, according to method

Variable	Pill	IUD	Rhythm	Condom	Dia-phragm	Spermi-cides	Other	No method
INTENTION AND AGE*								
Delay								
<18	4.5	4.4	15.9	7.8	14.2	15.5	9.1	33.5
18-19	3.1	4.9	17.5	8.7	15.7	17.1	10.1	36.5
20-24	4.5	4.3	15.7	7.7	14.0	15.2	9.0	33.0
25-29	3.4	3.2	12.0	5.8	10.7	11.7	6.8	26.0
30-44	3.9	3.8	13.9	6.8	12.4	13.5	7.9	29.8
Prevent								
<18	11.0	10.5	33.9	18.4	31.6	34.0	21.1	62.9
18-19	9.6	9.3	30.6	16.3	(28.3)	30.5	18.7	58.2
20-24	7.2	6.9	23.9	12.3	21.7	23.5	14.2	47.6
25-29	5.0	4.8	17.4	8.6	15.6	17.0	10.0	36.3
30-44	1.9	1.8	7.0	3.3	6.2	6.8	3.9	15.7
RACE†								
Black	4.5	4.3	2.3	7.7	13.9	15.1	8.9	32.5
Other	4.7	4.5	20.6	8.1	14.5	15.8	9.3	33.7
PARITY‡								
0	3.9	3.8	14.1	6.8	12.3	13.4	7.9	29.5
≥1	6.6	6.3	22.4	11.2	20.0	21.6	13.0	44.3
INCOME§								
<100%	5.4	5.2	18.6	9.3	16.7	18.2	10.8	38.2
100%-299%	4.7	4.5	16.2	8.0	14.5	15.7	9.3	33.8
≥300%	3.9	3.7	13.7	6.7	12.2	13.2	7.8	29.0

*Standardized by race, parity and income.

†Standardized by contraceptive intention, age, parity and income.

‡Standardized by contraceptive intention, age, race and income.

§As a percentage of the federally designated poverty-level income; standardized by contraceptive intention, age, race and parity.

Note: Parentheses indicate that there are no intervals in cell (see Appendix, p. 209).

ences shown in Table 5, however, we should remember that single black women are substantially less likely than single women of other races to report pregnancies ending in abortion,¹⁶ a difference that would tend to produce a greater understatement of black use-failure rates.

The results for income and parity among single women are consistent with the findings for married women. Not only are the relationships between these variables and the risk of unintended pregnancy in the same direction as those for married women, they are also of similar magnitude. These factors, then, probably operate in the same manner for both marital-status groups.

Conclusions

In general, the patterns of use-effectiveness of contraceptive methods are similar for both married and single women. Single women have lower failure rates than married women do, but much of this difference is due to the fact that single women are less likely than married women to report that they had an abortion. When differences by marital status in the reporting of abortion are taken into

consideration, the failure rates of the two groups of women are much closer.

Comparisons show that the pill and IUD are the most effective methods for both single and married women. It is also clear from these comparisons that among both groups, the condom has an intermediate failure rate and spermicides have a high rate. For the remaining methods (the diaphragm and rhythm), the two groups diverge: Among married women, use of these methods is associated with intermediate failure rates similar to that found for the condom; among single women, their use is associated with high failure rates more like that of spermicides. Users of no method have the highest failure rates among both groups of women.

The results of this study show marked similarities not only among single and married women, but also among adolescents and older women. Although adolescents are at generally higher risk of unintended pregnancy than are older women, only one variable in either model was found to have different effects for the two age-groups—contraceptive intention among single women. However, the factors responsible for the overall age

difference in the risks of unintended pregnancy have not been identified.

This study points to the need for further research into the effects of two factors that have an impact on the failure rates. First, the effects of underreporting of abortion on contraceptive failure rates that are derived from survey data must be estimated in more detail. Differences in the likelihood that an abortion is reported, depending on type of method used and on the characteristics of the user, must be determined before an accurate adjustment of failure rates can be achieved. Only when the impact of this underreporting is effectively controlled can levels of risk of unintended pregnancy be accurately estimated for subgroups of women, particularly for single women. Second, the effects of coital frequency on differences in levels of unintended pregnancy must be understood. The results of the NSFG-III do contain some information on frequency of intercourse for a limited period before the survey date. Future analyses of such data should provide ways to incorporate that information into the statistical models employed here. The information derived from such an analysis would allow researchers to partially disaggregate the components of use-failure rates, and would provide additional insights into group

differences in the effectiveness of contraceptive practice.

Appendix

• **Sample selection.** During the first stage of the selection process, individual respondents were examined and excluded from the study if they had never been exposed to the risk of pregnancy during the entire observation period (i.e., if first menses had not occurred by the end of observation [July 1982], if first intercourse after first menses had not occurred by the end of observation or if they had become noncontraceptively sterile prior to the start of observation). Among the remaining eligible women, pregnancy intervals were excluded from the study if no exposure could have occurred within the observation period (i.e., if the pregnancy interval ended prior to the start of observation, if the pregnancy ending the interval overlapped the start of observation or if the pregnancy interval began after the end of observation).

Finally, each of the remaining eligible pregnancy intervals was examined for intervals of contraceptive use and nonuse. Intervals were ineligible for inclusion in the study if no exposure could have occurred within the observation period (i.e., if the interval ended prior to the start of observation or

began after the end of observation), or if unintended pregnancy was not possible during the interval (i.e., if the woman was trying to get pregnant or if, during the entire interval, she was not having intercourse).

Before a life table can be constructed, the way in which each interval of exposure was terminated must be identified from the data. Each exposure interval included in the study was coded as terminating in one of three major ways—unintended pregnancy (the focus of this study), cessation of use for "other reasons" (i.e., changed methods, stopped method use to try to get pregnant or was noncontraceptively sterilized), and close of observation (used for more than 12 months or continued use at the end of the observation period). Stopping for "other reasons" was a competing risk that was statistically removed from the analysis. Thus, the use-failure rates produced in this study are "gross rates."¹⁷

Unintended pregnancy is defined by the occurrence of either of two events. The first is a contraceptive failure, which is considered to have taken place when the month in which method use stopped came after the month in which a pregnancy began, or when the month in which use stopped was the same month in which the pregnancy began but the respondent reported that she had not stopped use at the time of conception. The second is unintended pregnancy during nonuse of a contraceptive method. This event is considered to have occurred either when no method was used during the month in which a pregnancy began and the respondent reported she was not trying to become pregnant, or when the end of method use and the beginning of a pregnancy occurred during the same month and the respondent reported she had stopped method use before the conception occurred, but not because she wanted to get pregnant. The latter circumstance is classified as an unintended pregnancy during the first month of an interval of nonuse.

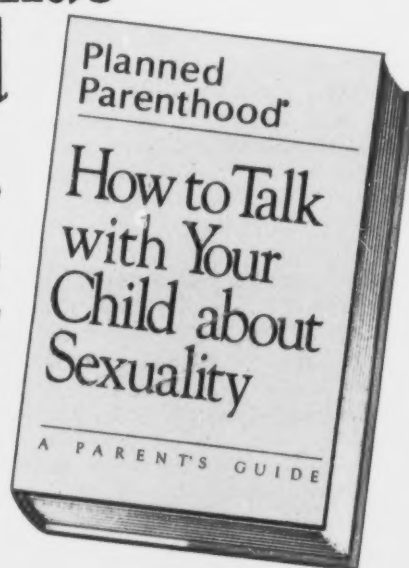
• **Contribution of exposure.** Before intervals can be entered into a life table, the amount of exposure contributed during the interval at each duration-month included in the life table must also be ascertained. This is accomplished using three pieces of information—the first and last months of observed exposure during the interval and the way in which the interval was terminated. The first observed duration-month is month one for all intervals beginning within the observation period. For intervals overlapping the beginning of observation, however, the first observed duration-month is the month of exposure during which observation began (where months of exposure is equal to total months

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minus months of no intercourse). For example, a woman whose sixth continuous month of contraceptive use overlapped the beginning of observation (January 1, 1979) would be coded as having a first observed duration-month of six. It should be noted that exposure is considered to begin no sooner than the beginning of the second month after a pregnancy termination; this delay in exposure is to allow for postpartum amenorrhea. The last duration-month of observed exposure is equal to the total length of the interval of exposure (in months), less the number of months of no exposure as well as the number of months occurring after the end of observation. Since one-year unintended pregnancy rates are calculated in this study, any duration greater than 12 ordinal months is set equal to 12.

In calculating the amount of exposure contributed by respondents during each calendar month of observation, the following rules apply. During the first calendar month of observed use, respondents contribute only one-half month of exposure, on the assumption that they were first observed, on average, halfway through that month. The exception to this rule is when the first month of observation is not the first month of use (i.e., use overlaps the beginning of observation). In this case, a full month of exposure is contributed, because observation begins on January 1, 1979. During the last calendar month of observed use, respondents contribute only one-half month of exposure, on the assumption that they were last observed, on average, halfway through that month. An exception to this rule is when use overlaps the end of the observation period, in which case observation ends on the last day of the final month of the observation period, and a full month of exposure is contributed. During all other calendar months, a full month of exposure is contributed. The exceptions to this rule are cases in which the calendar month is the first month of a period of no intercourse (when a half month of exposure is contributed, on the assumption that the period of no

intercourse began, on average, halfway through the month), and in which the calendar month is the last month of a period of no intercourse (when a half month of exposure is contributed, on the assumption that the period of no intercourse ended, on average, halfway through the month). It is important to remember that the rates reported here are 12-month rates. Thus, only the first 12 months of exposure are considered. Cases in which observed durations of exposure are greater than 12 months are censored at 12 months and coded as continuing users at that duration.

• *The Model-Fitting Procedure.* A baseline hazards model that contained all main effect terms and all two-term interactions was established. (Only two-term interactions were considered, because higher order interactions are difficult to interpret and are of little substantive value.) Second, all sets of interactions that did not significantly contribute to the model's fit (at the 0.05 level) were deleted. Third, all variables that were not significant were deleted. Finally, adjacent categories of variables were collapsed if they did not significantly alter the model's fit. Because of numerous significant interactions involving marital status, separate models for single and married women were constructed and the above procedure was applied to each.

• *Cell size.* Since the failure rates reported in this article are the results of a regression, each individual rate shown in a table is not dependent on the number of intervals included in the cell. Some cells not only contain no intervals, but would not be expected to contain any. For example, we would not anticipate finding very many married women under age 20 who are trying to prevent any additional births. Although failure rates are shown in Tables 3 and 5 even for categories of women with such rare characteristics, these rates are of limited substantive value. Thus, the failure rates calculated for the entirely empty cells have been placed in parentheses in these tables.

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Adolescent Pregnancy in the United States: An Interstate Analysis

By Susheela Singh

Summary

Rates of teenage pregnancy, birth and abortion vary greatly among states. Because states that have high birthrates tend to have low abortion rates, pregnancy levels vary much less than do the birth and abortion measures. The role of unintended pregnancy is highlighted by the fact that in states that have very high pregnancy rates, the adolescent abortion rate is higher than the birthrate and the abortion rate combined in states that have the lowest pregnancy rates.

A series of multivariate analyses that controlled for the percentage of the state population that was black, poor and metropolitan showed that social factors tend to be more important determinants of state differences in teenage pregnancy, birth and abortion levels than are policy-related variables, particularly for whites. Nevertheless, some policy measures have important associations for both races, especially for blacks.

• **Social factors.** High rates of population growth and residential mobility over the previous decade, a high crime rate, a high teenage suicide rate, extensive circulation of sexually explicit magazines, a large percentage not voting in elections and a high level of stress are all associated with high pregnancy-related rates for teenagers. The percentage of children living in female-headed households correlates positively with abortion and pregnancy levels among white teenagers, but has no significant association with the birthrate.

The percentage of a state's population that belongs to fundamentalist religious groups is positively associated with adolescent birthrates. Political liberalism correlates with relatively low pregnancy rates and birthrates but with a somewhat higher likelihood of pregnancies being terminated by abortion. In states where women's status is higher, birthrates are lower, but abortion levels are higher.

• **Policy measures.** States that have high proportions of teenagers dropping out of school and of young women not graduating from high school tend to have high pregnancy rates and birthrates and a somewhat lower proportion of pregnancies ending in abortion. Increased spending on education is associated with relatively high abortion rates (and, therefore, pregnancy rates). The higher the teacher-student ratio, the lower the adolescent birthrate and the more likely the pregnant teenager is to have an abortion.

Welfare payments to teenage mothers are negatively associated with both black and white teenage birthrates, and higher maximum payments are associated with relatively high abortion levels. Thus, such welfare payments do not appear to be an incentive for childbearing among black or white adolescents.

Only one measure of sex education—the proportion of senior high school students receiving sex education—proved significant: the higher the proportion, the lower the pregnancy rate among white teenagers.

The availability of Medicaid funds for abortion is associated with relatively high abortion levels and (for blacks) significantly lower birthrates. The accessibility of large abortion providers in a state is associated with relatively high abortion rates.

The lack of state data on contraceptive use and sexual activity makes it difficult to measure the effect of contraceptive availability on teenage pregnancy-related measures. A greater availability of physicians in

a state is associated with a lower teenage birthrate but with higher teenage abortion levels; there is very little effect on the pregnancy rate.

When preexisting birthrates and abortion availability are controlled for, substantially lower birthrates are seen for both white and black teenagers in states with high proportions served by family planning clinics. However, no significant difference is seen for pregnancy rates. It is notable that the greater the increase in the percentage of women served by family planning clinics over the previous decade, the greater the decline in the birthrate among both white and black adolescents. Data are not available to examine if there is a similar association with the pregnancy rate.

Introduction

The levels of teenage births and abortions are much higher in the United States than in other developed countries because of the very high rate of unintended pregnancies among U.S. teenagers.¹ A recent study has identified some factors at the national level that help to explain these observed pregnancy differentials among countries that have similar levels of adolescent sexual activity. Among them are the distribution of income, societal openness about sex and accessibility of contraceptive services.² But are these factors as important within the United States as between countries in explaining variation in levels of adolescent pregnancy?

Three earlier studies looked at interstate differences in the teenage birthrate during the early 1970s.³ Two of these analyses found that between 1970 and 1974, several factors had especially strong associations with high adolescent birthrates.⁴ These were high percentages of the population that are black, poor and fundamentalist. The number of teenagers served by organized clinics divided by the sum of teenage births and abortions also showed a strong positive association with the decline in the teenage birthrate that oc-

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curred during this period. The study on which the present article is based focuses on teenage reproduction in a more recent period—1980. In addition, unlike earlier state and substate analyses that could consider only birthrates,⁵ this study also directly examined factors associated with pregnancy rates and abortion rates.

Although the use of states as the unit of analysis has definite advantages, since many important policies are decided at the state rather than the county or local level, this approach also has some methodological drawbacks.⁶ The danger of incorrect or overstated interpretations (whereby associations based on measures for geographic areas are interpreted in terms of the behavior of individuals)—the so-called ecological fallacy⁷—is dealt with by keeping interpretations at the level of states.

The Variables and the Analysis

The relationships between teenage pregnancy and demographic, social and economic attributes of states, as well as a number of policy-related factors, are examined in this analysis. Many factors that are important and measurable were considered, but only a selection representing the different types of factors is shown.

Most variables were measured as of 1980 or the late 1970s in order to relate them to reproductive behavior during 1980. All dollar variables were standardized using an estimated state consumer price index.⁸ Although the survey from which the sex education measures were obtained was fielded in 1982, we use these variables on the assumption that relative differences would not have changed greatly from the late 1970s to 1982. It is unfortunate that no adequate measure of sexual openness at the state level could be obtained, in view of the finding of the international study that this was a significant explanatory factor.⁹

The unavailability of state data on contraceptive use and sexual activity is an extreme-

“Demographic, social and economic characteristics (which can include educational attainment) are more important than policy measures in explaining the differences between states in the rates of teenage pregnancy, birth and abortion. . . .”

ly important limitation, particularly for such policy-related variables as family planning and abortion services, which may be considered as societal responses to high rates of pregnancy and birth. Contraceptive use and sexual activity are the two main proximate determinants of pregnancy, intervening between fundamental socioeconomic and policy-related factors and pregnancy. No data exist on state-level differences in the proportion of teenagers who obtain contraceptives from private physicians or from drugstores. Thus, although we look at the percentage of teenagers served by family planning clinics, this factor is in no way equivalent to the overall percentage of teenagers using contraceptives. Nor is the percentage married a substitute for the percentage sexually active; it represents only a small proportion of those sexually active and probably does not have the same relative variation across states as overall sexual activity does. Because data needed to examine the relationship between use of family planning services and pregnancy rates independent of sexual activity levels are not available, additional analyses were carried out to help understand the relationship.

It has been our aim to analyze black and white teenage rates separately. However, only those independent factors designated by a dagger in Tables 2 and 3 (pages 214–215) can be measured by race. Virtually all of the policy measures and some of the measures of social integration are based on statewide characteristics and cannot be distinguished at the state level for blacks and whites. One potential difficulty is that since these measures are heavily weighted by characteristics of the majority white segment of the state's

population, they may not be very relevant for understanding the behavior of black teenagers. Other data-related issues are discussed in Appendix 1 (page 219).

Pregnancy and childbearing rates are not treated separately among married and unmarried adolescents.[†] Multiple regression analyses that controlled for the percentages black, poor and living in metropolitan areas in each state were used to evaluate the relative importance of factors associated with teenage pregnancy and childbearing. The methodology is described in detail in Appendix 2 on page 220. We focus on standardized beta coefficients in interpreting the results of the multivariate analysis. Because these coefficients are standardized, they may be used to compare the relative effect of different variables.[‡] All beta coefficients of 0.15 or greater are shown because strict application of the significance rule would suppress quite sizable coefficients; the analysis, however, is generally confined to results significant at the 0.05 level or better.[§] In any case, since these are not population samples, the results of significance testing should be regarded only as a rough guide.

Variations Between States

As may be seen in Table 1 (page 212), in 1980 there were 111 pregnancies per 1,000 15–19-year-olds in the United States. States with high or low teenage pregnancy rates may exhibit different combinations of birth and abortion levels. Thus, Mississippi, with a very high teenage pregnancy rate, has the highest teenage birthrate, but one of the lowest abortion rates of all the states. California, on the other hand, with an even higher pregnancy rate than Mississippi's, has only a mod-

*The small number of cases is one problem, a further disadvantage is that any measure that is averaged across a state will blur variation across smaller areas within states. A third issue, the confounding of factors studied with the socioeconomic and racial composition of the states, is approached in this article by controlling for the percentage of the population that is black, poor and living in metropolitan areas, and by carrying out some analyses separately for whites and blacks.

†Abortion data for unmarried teenagers are unavailable for most states and, therefore, pregnancy rates could not be calculated. In addition, the fact that a substantial proportion of marriages among teenagers are the result of premarital conceptions reduces the advantage of analyzing marital and nonmarital fertility separately. Because of the relatively low proportion of births to black teenagers who are married as compared with the proportion among

whites (14 percent versus 65 percent), racial comparisons would be less meaningful if marital and nonmarital rates were analyzed separately.

‡The metric or unstandardized betas were compared with the standardized betas, and the same interpretations and conclusions were supported by both sets of results. Use of standardized coefficients to compare different samples is generally not advisable, because both the means and the standard deviations change from sample to sample. However, in this analysis, although the comparisons involve subsets of states (22, 34, 32 and all 50 in different instances), we feel that the standardized beta coefficients are preferable. The issue of subsamples is not a major one, because the population is so small, in only a few cases is there a large difference in standard deviations between the black and white subsamples. Factors with noticeably different standard deviations between blacks and whites

are: pregnancy and abortion rates—a larger deviation among blacks, the percentage poor and the percentage unemployed—a larger deviation among blacks, the percentage married—a smaller deviation among blacks; and the percentage served by clinics—a smaller deviation among the states that have large black populations. In addition, by standardizing for the size of the deviation, we are using a conservative measure of the difference between subgroups—unstandardized betas would appear larger when factors have larger variances; use of the standardized betas as a measure of strength of relationships reduces the tendency to make causal interpretations, which is unavoidable when unstandardized or metric coefficients are used. The metric betas and the standard deviations of variables are available on request.

§That is, with at least a 95 percent probability that the findings are not the result of chance.

Table 1. Rates of pregnancy, birth and abortion among women aged 15-19, ranked in descending order, by state, 1980

State	Pregnancy†						Birth						Abortion					
	Total		White		Black		Total		White		Black		Total		White		Black	
	Rate	Rank	Rate	Rank	Rate	Rank	Rate	Rank	Rate	Rank	Rate	Rank	Rate	Rank	Rate	Rank	Rate	Rank
Number of states	50		32		22		50		50		34		50		32		22	
U.S. total	111.2	na	u	na	u	na	53.3	na	u	na	u	na	42.9	na	u	na	u	na
Ala.‡	117.3	16	u	na	u	na	68.3	10	52.5	15	102.9	18	32.2	31	u	na	u	na
Alaska‡	124.2	9	u	na	u	na	64.4	15	48.2	23	u	na	42.7	15	u	na	u	na
Ariz.	123.2	10	114.7	4	194.5	8	65.5	12	59.6	9	124.3	7	40.6	17	39.3	12	41.2	14
Ark.	117.2	17	103.6	9	167.6	16	74.5	5	62.9	8	118.2	10	25.3	40	25.5	26	23.4	21
Calif.	140.2	2	126.8	2	271.9	1	53.3	25	51.0	18	89.1	28	69.3	1	59.6	2	150.0	1
Colo.	113.7	18	104.9	8	192.0	10	49.9	31	47.6	24	90.8	25	48.9	8	43.4	6	75.5	6
Conn.‡	80.7	45	u	na	u	na	30.5	49	24.4	49	89.6	27	40.1	19	u	na	u	na
Del.	105.6	25	u	na	u	na	51.2	28	36.9	38	110.4	14	40.1	19	u	na	u	na
Fla.‡	131.2	4	u	na	u	na	58.5	18	42.5	30	125.7	5	55.4	5	u	na	u	na
Ga.	130.9	5	111.0	6	171.6	15	71.9	8	53.7	14	109.9	15	40.5	18	42.3	8	36.1	16
Hawaii	105.6	25	81.2	26	u	na	50.7	30	30.6	45	u	na	40.7	16	40.4	11	u	na
Idaho	96.4	34	95.5	14	u	na	59.5	17	58.9	10	u	na	22.7	44	22.6	28	u	na
Ill.	100.6	33	77.5	28	190.0	12	55.8	24	41.4	32	122.0	8	30.6	34	25.3	27	39.6	15
Ind.	101.9	29	92.1	20	192.7	9	57.5	21	52.2	16	111.7	13	29.9	35	26.8	23	53.3	10
Iowa‡	79.0	48	u	na	u	na	43.0	39	41.3	33	u	na	25.0	41	u	na	u	na
Kan.	101.0	31	92.9	19	198.6	7	56.8	23	51.2	17	125.4	6	29.8	36	28.6	21	43.8	12
Ky.‡	110.7	21	u	na	u	na	72.3	7	69.3	2	107.3	17	21.8	47	u	na	u	na
La.	118.1	15	93.1	18	162.6	17	76.0	3	57.8	11	109.7	16	24.4	42	21.6	30	28.1	19
Maine	86.9	40	85.9	24	u	na	47.4	34	46.8	25	u	na	27.3	38	27.0	22	u	na
Md.	122.5	11	102.7	10	174.4	14	43.4	38	31.4	44	75.9	32	64.0	3	59.1	3	75.7	5
Mass.	85.7	42	u	na	u	na	28.1	50	25.7	48	73.9	34	47.3	10	u	na	u	na
Mich.	102.4	28	u	na	u	na	45.0	37	37.2	37	92.0	23	44.0	12	u	na	u	na
Minn.	77.0	49	72.8	31	240.1	2	35.4	44	32.7	43	126.3	3	31.4	33	30.5	18	80.5	4
Miss.	125.0	8	96.7	13	162.4	18	83.7	1	56.2	12	120.3	9	22.3	46	26.6	24	16.4	22
Mo.	106.4	24	91.9	22	204.6	6	57.8	20	49.6	20	114.9	11	33.6	28	29.4	20	60.7	9
Mont.	93.3	38	85.1	25	u	na	48.5	32	42.0	31	u	na	31.9	32	31.6	17	u	na
Nebr.	80.7	45	u	na	u	na	45.1	36	41.2	34	u	na	24.2	43	u	na	u	na
Nev.	144.0	1	133.8	1	225.8	3	58.5	18	50.3	19	128.0	1	67.1	2	66.8	1	65.6	7
N.H.‡	80.7	45	u	na	u	na	33.6	47	33.4	42	u	na	36.7	24	u	na	u	na
N.J.	95.8	35	73.6	30	209.8	4	35.2	45	23.4	50	97.0	21	48.7	9	41.3	10	84.9	3
N.M.	125.6	7	118.0	3	u	na	71.8	9	66.3	5	u	na	35.8	25	34.9	14	u	na
N.Y.	100.7	32	77.6	27	207.2	5	34.8	46	26.2	47	74.2	33	53.6	6	42.0	9	107.4	2
N.C.	110.3	22	92.1	20	152.5	20	57.5	21	44.8	27	87.7	29	37.5	23	34.8	15	42.9	13
N. Dak.	74.8	50	67.9	32	u	na	41.7	40	36.2	39	u	na	22.5	45	22.2	29	u	na
Ohio	101.3	30	88.0	23	190.3	11	52.5	27	46.1	26	100.2	20	34.8	26	29.7	19	63.7	8
Okla.	119.5	13	106.6	7	186.5	13	74.6	4	64.4	7	126.3	3	27.3	38	26.6	24	31.7	18
Oreg.	118.7	14	112.4	5	u	na	50.9	29	49.0	21	u	na	52.4	7	48.7	4	u	na
Pa.	90.3	39	u	na	u	na	40.5	41	34.5	41	90.7	26	37.9	22	u	na	u	na
R.I.	83.1	44	u	na	u	na	33.0	48	29.8	46	u	na	39.6	21	u	na	u	na
S.C.	113.7	18	98.0	12	139.8	22	64.8	14	48.7	22	91.9	24	32.7	30	35.9	13	26.9	20
S. Dak.	86.4	41	74.0	29	u	na	52.6	26	43.2	29	u	na	21.2	48	20.2	31	u	na
Tenn.	113.0	20	101.7	11	156.9	19	64.1	16	55.0	13	100.4	19	32.8	29	32.5	16	33.1	17
Tex.‡	137.0	3	u	na	u	na	74.3	6	68.3	3	112.0	12	43.5	13	u	na	u	na
Utah	94.6	37	93.5	17	u	na	65.2	13	64.9	6	u	na	14.9	50	14.2	32	u	na
Vt.	94.8	36	94.4	15	u	na	39.5	42	39.5	35	u	na	43.1	14	42.7	7	u	na
Va.	107.4	23	93.7	16	151.5	21	48.3	33	38.2	36	82.2	30	44.9	11	43.5	5	48.0	11
Wash.	122.3	12	u	na	u	na	46.7	35	43.9	28	96.9	22	60.3	4	u	na	u	na
W. Va.‡	103.6	27	u	na	u	na	67.8	11	67.4	4	80.0	31	20.2	49	u	na	u	na
Wisc.‡	84.8	43	u	na	u	na	39.5	42	34.6	40	127.8	2	34.0	27	u	na	u	na
Wyo.	126.6	6	u	na	u	na	78.7	2	76.7	1	u	na	29.2	37	u	na	u	na

†In order to take into account miscarriages and stillbirths, pregnancy rates are estimated as follows: $(1.2 \times \text{birthrate}) + (1.1 \times \text{abortion rate})$.

‡Abortion data estimated, based on the proportion of all abortions obtained by teenagers in similar states.

Notes: u = data unavailable or, in the case of blacks, that the black population was under 50,000; these states are omitted from the ranking. Na = not applicable.

erate birthrate, but the highest abortion rate of any state. Connecticut and South Dakota both have very low teenage pregnancy rates; but the former state has an extremely low birthrate and a somewhat higher-than-average abortion rate, while the latter has an average birthrate and a very low abortion rate. Only a small minority of states have high birthrates and high abortion rates, or low birthrates and low abortion rates. The former, as may be seen in Table 1, are Alaska, Arizona, Florida, Georgia, Nevada and Texas. The latter are Iowa, Maine, Minnesota, Montana, Nebraska and North Dakota.

The existing range for birthrates across states is large: it goes from 28 births per 1,000 teenagers in Massachusetts to 84 per 1,000 in Mississippi. The range in abortion rates is even greater—going from 15 per 1,000 15–19-year-olds in Utah to 69 per 1,000 in California. The range in pregnancy rates is proportionally much narrower—from 75 per 1,000 in North Dakota to 144 per 1,000 in Nevada. Thus, whereas pregnancy rates are about two times as great in the state with the highest as in the one with the lowest levels, abortion rates are nearly five times as high and birthrates are three times as high. States that exhibit high teenage birthrates among whites tend to have high black rates also ($r=0.39$).*

It is notable that in the two states with the highest teenage pregnancy rates, California and Nevada, the adolescent abortion rates are higher than the birthrates and abortion rates combined in the two states that have the lowest pregnancy rates, North Dakota and Minnesota. Thus, the extremes in pregnancy rates appear to be determined mainly by a greater prevalence of *unintended* conceptions in states with high pregnancy rates. This finding is similar to the result of the study comparing the pregnancy experience of U.S. teenagers with that of teenagers from other developed countries: The adolescent abortion rate in the United States is as high as or higher than the birthrates and abortion rates combined in Canada, England and Wales, France, the Netherlands and Sweden.¹⁰

The abortion ratio, the percentage of pregnancies terminated by induced abortion, indicates both the propensity of women to terminate a pregnancy and the availability of abortion services in the various states. The ratio is discussed separately here only when the pattern differs from that for the abortion rate. The ratio among teenagers in the United States is 39 per 100 pregnancies, and varies from a low of 16 in Utah to a high of 55 in Massachusetts. California, Connecticut, Maryland, Nevada, New Hampshire, New Jersey, New York, Rhode Island and Wash-

ington also have relatively high abortion ratios (over 45 per 100).

The four pregnancy-related measures are strongly associated with each other. Where the pregnancy rate is high, the birthrate is high for whites ($r=0.60$), but only marginally so for blacks ($r=0.18$), for whom very high pregnancy levels are accompanied by much higher abortion rates in the northern and western states; in addition, a high pregnancy rate usually coincides with a high abortion rate for both whites and blacks ($r=0.57$ and 0.80 , respectively). As may be expected, the abortion rate and ratio are highly and positively correlated ($r=0.83$). A higher abortion rate is generally accompanied by a lower birthrate ($r=-0.34$), especially among blacks ($r=-0.45$). This result is the opposite of that found in the comparative study of developed countries, where the abortion rate was positively correlated with the birthrate; that is, countries with low birthrates also tend to have low abortion rates and low pregnancy rates.¹¹ This contrast implies that the processes that produce differences in teenage pregnancy-related behavior among the states are probably not the same as those that produce differences among developed countries.

The Control Variables

The first numbered panel of Table 2 (page 214) shows the effect of each of the three basic control factors when the other two are held constant: When the percentages who are poor and who live in metropolitan areas are controlled for, the percentage black is relatively unimportant as a determinant of teenage reproduction in the total population; the birthrates of white teenagers are significantly higher where the percentage who are black is higher, probably because of the correlation that exists between residence in southern states and a higher percentage who are black in each state.

States that have a higher percentage of poor people have higher pregnancy rates and birthrates, after the percentage black and the percentage who live in metropolitan areas are controlled for. The percentage poor has weaker relationships with black teenage pregnancy rates and birthrates as compared with its relationship with the rates for all races and for the white population. The proportion living in metropolitan areas is positively related to the pregnancy rate (significantly so for white teenagers) and to the abortion rate (significantly for all teenagers and for whites).

The percentage of the variance in the pregnancy-related behavior variables that is explained by the three control variables fluctuates greatly. This percentage is generally

larger for the total population, ranging between 26 and 54 percent, than for the white population (21–39 percent), or among blacks (13–58 percent).

Demographic, Social & Political Factors

In regressions including the three control variables, states in which the teenage birthrate was high in 1970 have higher rates of teenage pregnancy and births in 1980, and these coefficients are usually highly significant (second panel of Table 2). The level of adult fertility in 1980 is highly and positively associated with the teenage birthrate in 1980. Higher adult fertility is not significantly associated with higher teenage pregnancy rates, but is significantly associated with lower abortion rates and ratios among all teenagers and among those who are white. In states in which a higher percentage of teenagers are married, white teenagers (and all teenagers) have higher birthrates and pregnancy rates and lower abortion ratios. Among blacks, only birthrates are significantly higher in those states.

Selected indicators of social integration and its absence, and of alienation and social dysfunction are included in the regression analyses (panel 3). These factors are not expected to be determinants of teenage pregnancy-related behavior in their own right, but they are proxies for the social climate that influences the behavior of teenagers. Data are not available to investigate the extent to which the influence of those variables operates at the state level through differences in sexual activity or contraceptive use.

Results show that the higher the rate of population growth between 1970 and 1980, and the higher the rate of residential mobility, the higher the pregnancy rates and birthrates. State population growth and mobility may be indicators of poorer community integration and less parental control over adolescents, as well as of insufficient knowledge of the social and health services available (including family planning). Population growth and mobility, which are associated with higher mean incomes, are accompanied by higher abortion rates among all teenagers and among white adolescents. Neither factor has any significant relationship with the proportion of pregnant teenagers who terminate those pregnancies by abortion. The state crime rate, the teenage suicide rate, the level of sales of sexually explicit magazines, the

*The range for whites is from 23 in New Jersey to 77 in Wyoming. For blacks, it is from 74 in Massachusetts to 128 in Nevada. There is little relationship between white and black abortion and pregnancy rates. The range in abortion rates for whites is from 14 in Utah to 67 in Nevada; for blacks, it is from 16 in Mississippi to 150 in California.

Table 2. Among women aged 15-19, standardized beta coefficients for rates of pregnancy, birth and abortion, and the abortion ratio, by selected demographic, social and political variables, after controlling for the percentage of teenagers who are black, poor and who live in metropolitan areas

Explanatory variable	Pregnancy rate			Birthrate			Abortion rate			Abortion ratio		
	Total	White	Black	Total	White	Black	Total	White	Black	Total	White	Black
No. of states	50†	32	22	50†	50†	34	50†	32	22	50†	32	22
1. Control variables												
% black (controlling poor, metro)	-	0.30	-0.45	-	0.24*	-0.37	-	-	-	-	-	0.35
% poor (controlling black, metro)	0.45*	0.64*	0.30	0.53**	0.51**	0.53	-	-	-	-0.36*	-0.30	-0.37
% metro (controlling black, poor)	0.30	0.57*	0.60	-0.18	-0.20	-	0.60**	0.55*	0.68	0.49**	0.34	0.64
% of variance explained by 3 control variables	26	21	55	49	39	13	41	27	50	54	31	58
2. Demographic & 3 controls												
Teenage birthrate, 1970†	1.00**	0.85**	-	0.83**	0.74**	0.79**	0.28	0.20	-0.42*	-0.31*	-0.32	-0.49**
Adult fertility, 1980†	-	-	0.33	0.34**	0.37**	0.60**	-0.28*	-0.49**	-	-0.42**	-0.61**	-0.28
% married, 1980†	0.66**	0.59*	-	0.83**	1.05**	0.52**	-0.17	-0.36	-	-0.60**	-0.82**	-0.22
3. Social characteristics & 3 controls												
% pop. growth, 1970-1980	0.66**	0.67**	-	0.44**	0.43**	0.43**	0.31**	0.32	-	-	-	-
% pop. moved county or state, 1975-1980†	0.68**	0.42*	-	0.35**	0.20	0.26	0.46**	0.38*	0.18	-	0.18	0.20
Crime rate, 1975	0.81**	1.09**	0.17	0.38**	0.28	0.38	0.58**	0.77**	0.18	-	0.22	-
Teenage suicide rate, 1978	0.64**	0.61**	-	0.32**	0.24	0.50**	0.43**	0.52**	-	-	0.20	-
Sales of sexually explicit magazines, 1980	0.69**	0.71**	0.20	0.34*	0.20	0.70**	0.48**	0.67**	-	-	0.31	-0.21
Index of stress, c. 1975-1980	0.73**	0.80**	-	0.35**	0.30*	0.21	0.52**	0.58**	-	-	0.17	-
% children in female-headed hhs, 1980†	-	0.55**	0.48	-0.29	-0.22	-	0.25	0.77**	0.16	0.37**	0.60**	-
% not voting in 1980	0.66**	0.61*	-	0.38**	0.34*	-	0.39**	0.68**	0.15	-	0.46*	0.19
4. Liberalism & 3 controls												
% fundamentalist, 1980	0.22	-0.32	-0.47	0.43**	0.46*	0.51*	-0.24	-0.23	-0.48	-0.37*	-0.45	-0.42
Liberalism score in House of Reps., 1979-1981	-0.41**	-0.36*	0.36	-0.53*	-0.55**	-0.74**	-	0.22	0.56*	0.39**	0.49**	0.56*
Index of women's status, 1975-1980	-	-	0.15	-0.33*	-0.43**	-0.22	0.46**	0.47**	0.36	0.51**	0.64**	0.41*

*p < 0.05.

**p < 0.01.

†Variables measured race-specifically.

Note: In this and subsequent tables, dashes indicate coefficients smaller than 0.15.

‡Washington, D.C., is excluded from analysis because it is 100 percent urban and its inclusion would bias the results.

Sources: **Percent black**—U.S. Bureau of the Census, 1980 *Census of Population*, Vol. B 2-52, U.S. Government Printing Office (GPO), Washington, D.C., 1983, Table 14; **Percent poor, 1980**—The Alan Guttmacher Institute (AGI), unpublished tabulations of 1980 census data; **Percent metro, 1980**—AGI, unpublished tabulations of 1980 census data; **Teenage birthrate, 1970**—see reference 25; **Adult fertility, 1980**—see reference 25; **Percent married, 1980**—AGI, unpublished tabulations of 1980 census data; **Population growth, 1970-1980**—U.S. Bureau of the Census, 1980 *Census of Population*, Vol. B 2-52, GPO, Washington, D.C., 1983, Table 19; **Population moved, 1970-1980**—U.S. Bureau of the Census, 1980 *Census of Population*, Vol. B 2-52, GPO, Washington, D.C., 1983, Table 21; **Crime rate, 1975**; **Teenage suicide rate, 1978**; **Sales of sex magazines, 1980**; **Index of stress, 1975-1980**; **Index of women's status**—all involve special tabulations from M. A. Strauss, *State and Regional Indicators Archive*, University of New Hampshire, Durham, 1985; **Percent of children in female-headed households**—U.S. Bureau of the Census, 1980 *Census of Population*, Vol. B 2-52, GPO, Washington, D.C., 1983, Table 21; **Percent not voting, 1980**—U.S. Bureau of the Census, *Statistical Abstract of the United States: 1982-83*, GPO, Washington, D.C., 1982, Table 803, p. 491; **Percent fundamentalists, 1980**—Glenmary Research Center, unpublished data from 1980 survey of churches, Atlanta, 1982; **Liberalism score, 1979-1981**—M. Barone and G. Ujifusa, eds., *Almanac of American Politics*, Barone and Co., Washington, D.C., 1982.

index of stress* and the percentage not voting show relationships for all teenagers similar to those of population growth and mobility: Where they are high, rates of pregnancy, birth and abortion are high.

*A higher value in the index of stress indicates more severe occurrence of social and economic problems based on economic factors (e.g., business failures, unemployment claims), family stress factors (divorce, abortion, fetal death), and other events (disaster assistance, new housing units, new welfare recipients, percentage of high school dropouts, percentage moved). The data were obtained from M. A. Strauss (see footnotes to Table 2).

†The association is significant for all teenagers, but not for blacks or whites separately, probably because of the small number of states examined.

Among white teenagers, the proportion of children who live in female-headed households is positively and significantly correlated with the pregnancy rate and the abortion rate and ratio, but has no significant association with the birthrate. (For all adolescents, only the abortion-ratio relationship is significant; for blacks, none is significant.) Of all the indicators of social integration, the proportion of children in female-headed households has the strongest association with the probability that pregnant white teenagers will have abortions. Unemployment rates among male and female teenagers were included in the regression equation, but were found to have no significant relationship with

teenage pregnancy, birth or abortion rates at the state level, and are not shown.

In general, these results support the hypothesis that states with lower social integration, and with greater social and economic problems, provide environments in which more teenagers are likely to become pregnant, to have abortions and to experience early motherhood.

As shown in panel 4, a higher percentage of fundamentalists in a state is associated with high birthrates for both black and white teenagers and with low abortion ratios.† Greater political liberalism in a state (as measured by the voting behavior of the state's delegation in Congress) is correlated with lower birth-

rates for both black and white teenagers. This factor is associated with relatively high abortion ratios (and, for blacks, with significantly high abortion rates), and with low pregnancy rates (significantly so for all teenagers and for whites, but there is no significant relationship for blacks). Higher economic, legal, educational and political status of women has much the same relationship with the birthrate and with abortion levels as does greater political liberalism; that is, higher status is associated with lower birthrates and with higher abortion rates and ratios. (For black teenagers, the results are significant only for the abortion ratio.)

Policy-Related Factors

• **Education.** Educational effort is measured in this study by the amount of public funds spent per student and by the number of teachers per student (panel 1, Table 3). States in which public expenditures for edu-

cation are high tend to have relatively high teenage pregnancy and abortion rates and (for whites), high abortion ratios. A high teacher-student ratio also is correlated with a high teenage abortion ratio, and is significantly and strongly associated with low teenage birthrates. These results suggest that motivation to avoid childbearing is greater in states where the quality of education is better. There is, in fact, greater availability of abortion services in states that provide better education. The correlation between the percentage of a state's population living in counties that have at least one facility providing 400 or more abortions annually and the dollars spent on education is 0.29 ($p \leq 0.05$). The number of teachers per student may more accurately reflect what resources are actually available to children than do expenditures and may, therefore, be a better measure of educational quality.

Low educational attainment is measured

by the percentage of male and female 16-19-year-olds who had dropped out of high school as of 1980 and the percentage of 20-24-year-old women who had not graduated from high school. The drop-out rate is strongly and positively related to the teacher-student ratio ($r = 0.43$). Pregnant adolescents who have a baby are more likely to drop out of school, and those who drop out are more likely to become pregnant and to have a child. Even after controlling for the percentage black, poor and metropolitan, we find that states in which there is a relatively high drop-out rate have significantly higher teenage pregnancy rates (all teenagers and whites only) and birthrates (among both whites and blacks) than do states with low drop-out rates. There are no significant relationships with the abortion rate, but in states where drop-out rates are high, abortion ratios are significantly lower for the total teenage group. The percentage of 20-24-year-old women not graduating

Table 3. Among women aged 15-19, standardized beta coefficients for rates of pregnancy, birth and abortion, and the abortion ratio, by selected policy-related variables, after controlling for the percentage of teenagers who are black, poor and who live in metropolitan areas

Explanatory variable	Pregnancy rate			Birthrate			Abortion rate			Abortion ratio		
	Total	White	Black	Total	White	Black	Total	White	Black	Total	White	Black
1. Education & 3 controls												
\$ spent per student, 1980	0.37**	0.18	-	-	-	-	0.35**	0.36	0.16	0.20	0.36*	0.19
Teacher-student ratio, 1979-1980	-0.27	-0.18	-	-0.33**	-0.38**	-	-	0.22	-0.19	0.30**	0.42*	-
% 16-19-yr. olds dropped out, 1980†	0.69**	0.89**	-	0.61**	0.73**	0.54**	0.15	0.21	-0.31	-0.25*	-0.35	-0.28
% women aged 20-24 not graduating, 1980†	0.78**	0.84**	-	0.74**	0.77**	0.51*	-	-	-0.24	-0.31*	-0.44*	-0.17
2. AFDC & 3 controls												
Max. payment to 2 persons, 1980	-	-	0.63**	-0.42**	-0.43*	-0.30	0.45**	0.48*	0.79**	0.53**	0.52*	0.69**
% of pop. on AFDC, 1977	-0.21	-0.29	0.58*	-0.20	-0.27*	-0.34	-	-	0.43	-	0.16	0.22**
Index of AFDC coverage, 1980‡	-0.36*	-0.29	0.26	-0.38**	-0.37**	-0.45*	-	-	0.32	0.19	0.24	0.27
3. Sex education & 3 controls												
% received sex ed. in sr. high, 1982	-	-0.98**	0.36	-	-	-	-	-0.54	0.18	-	-	-
4. Abortion & 3 controls												
Availability of Medicaid funds, 1980-1981	0.23	-	0.30	-	-	-0.55**	0.34**	0.42*	0.53**	0.22*	0.55**	0.53**
Index of nonrestrictive abortion policies	0.22	0.29	0.32	-	-	-	0.27*	0.33	0.41*	-	0.17	0.33
% in counties with large providers, 1980	0.55**	0.38	0.40*	-	-	-	0.57**	0.66*	0.45*	0.27	0.57*	0.33
Adult abortion rate, 1980	0.58**	0.27	0.47*	-	-0.21	-0.43	0.88**	0.86**	0.79**	0.65**	0.89**	0.74**
5. Index of availability of doctors, c. 1975-1980 (& 3 controls)												
	-0.16	-0.19	0.32	-0.44**	-0.44**	-0.63**	0.34*	0.41*	0.57*	0.52**	0.66**	0.59**

* $p < 0.05$.

** $p < 0.01$.

†Variables measured race-specifically.

‡Based on the number of basic items covered, the number of special items and whether the unborn child and the unemployed parent are covered.

Sources: **Education dollars spent/student**—W. V. Grant and L. J. Eiden, *Digest of Educational Statistics, 1981*, National Center for Education Statistics, Washington, D.C., 1981, Tables 69 and 70, pp. 80-81; **Teacher-student ratio, 1979-1980**—same book as preceding, Table 45, p. 54; **16-19 drop-out rate, 1980**—U.S. Bureau of the Census, *1980 Census of Population*, Vol. C 2-52, GPO, Washington, D.C., 1983, Tables 66 and 76; **Percent women 20-24 not graduating, 1980**—U.S. Bureau of the Census, *1980 Census of Population*, Vol. D 2-52, GPO, Washington, D.C., 1983, Table 203; **AFDC maximum, 1980**—"AFDC Standards for Basic Needs," Social Security Administration, Dept. of Health and Human Services (DHHS), Washington, D.C., Mar. 1981, Table 5; **Percent AFDC, 1977**—M. A. Strauss, see footnotes to Table 2; **Index of AFDC, 1980**—"Characteristics of State Plans for Aid to Families with Dependent Children," Social Security Administration, DHHS, Washington, D.C., 1980; **Percent receiving sex education, 1982**—F. L. Sonenstein, unpublished data, see reference 14; **Medicaid expenditures for abortion, 1980 and 1981**—R. Gold, "Publicly Funded Abortions in FY 1980 and FY 1981," *Family Planning Perspectives*, 14:204, 1982, Table 2; **Abortion restrictions as of 1 Jan. 1979**—AGI, *Abortion: Needs, Services and Policies*, New York, 1979, Table A; **Percent in counties with large abortion providers, 1980**—unpublished data from the AGI 1981 survey of abortion providers; **Adult abortion rate, 1980**—see references 26 and 27; **Index of MD availability**—M. A. Strauss, see footnotes to Table 2, and unpublished tabulations from an AGI 1982 survey of physicians in private practice.

from high school has similar relationships with pregnancy-related behavior. These relationships are plausible, since we would expect lower educational attainment to be associated with less effective practice of contraception to avoid pregnancy and with a lower probability of ending a pregnancy by abortion among those teenagers who do become pregnant.

• *Aid to Families with Dependent Children.* Three indicators of the extent of AFDC coverage and the level of payments were used here to explore whether these benefits might provide an incentive to teenagers to have a child.

As may be seen in panel 2 of Table 3, all three measures of the quality of the AFDC program are *negatively* associated with the teenage birthrate, for both white and black teenagers (although only the index is significantly correlated for each race considered separately). Higher maximum AFDC payments to two persons with no other income (the likely financial position of a teenager having her first child) are significantly associated with higher abortion rates and ratios for all groups. In absolute terms, states in which the maximum monthly AFDC payment for two persons is \$100 higher than in other states show birthrates about nine points lower and abortion rates about eight points higher than the comparable rates found in the other states. Higher AFDC payments and a larger proportion receiving benefits are associated with higher pregnancy rates among

black teenagers, but this relationship is accompanied by high teenage abortion rates and ratios among blacks. Birthrates of teenage blacks in states with more comprehensive AFDC programs are lower than those in states with less comprehensive programs. These data show that more generous state AFDC coverage is not acting generally as an incentive for teenage childbearing.

It is notable that there is a significant and positive relationship between the percentage of women receiving AFDC payments in a state and the availability there of Medicaid funds for abortion.

• *Sex education in schools.* Sex education varies a good deal within states. The content of sex education classes and even whether the subject is taught at all are generally decided by individual school districts rather than by the state government. Even where a general state policy exists, local school districts interpret and apply it in different ways.¹² Nevertheless, many proponents of sex education in the schools argue that sex education should lead to lower teenage pregnancy rates and birthrates because it increases the practice of effective contraception,¹³ whereas opponents hold that sex education leads to increased sexual activity and, therefore, to higher pregnancy rates.¹⁴ We considered five measures of state policy on teaching the subject in the schools and on the extent of instruction. These were the percentage who received sex education in junior high school, the percentage who had such instruction in senior high school and the number of class periods of sex education, all in 1982,¹⁵ whether parental consent was required in 1978; and whether in 1978 the state had a liberal policy with regard to sex education.¹⁶ Only one measure showed any significant association: A higher proportion of senior high school students receiving sex education is strongly and significantly associated with a low pregnancy rate among white teenagers (panel 3 of Table 3). In absolute terms, a state in which 10 percent more teenagers receive sex education has a teenage pregnancy rate for whites that is five points lower than that in other states (not shown). Data are not available to address the question of the extent to which this relationship occurs through state differences in sexual activity or contraceptive use. The other four measures in the regression had no significant associations and are not shown in the table.

• *Availability of abortion services.* The state climate surrounding abortion is measured by two variables: whether Medicaid funding for abortions was available in 1980–1981 and an index summarizing restrictions on abortion. † Lack of Medicaid funding may constitute a concrete limitation in itself and may also indi-

cate a restrictive official stance on abortion, or it may reflect general attitudes about paying for any services for the poor. The abortion index is meant to indicate the official climate in the state relative to abortion. Access to abortion is approximated by two factors: the percentage of the state's population who in 1980 lived in counties with facilities providing 400 or more abortions annually, and the 1980 abortion rate for adult women in the state. Caution must be taken in interpreting the results of this analysis, since accessibility of services may be an indicator of the extent of unintended pregnancies that already existed and, therefore, of the demand for abortion services as well as the supply of such services.

After including the three control variables, the availability of Medicaid funds for abortion was found to have a significant association with lower birthrates among black adolescents (panel 4 of Table 3). This finding is probably related to the fact that black teenagers are more likely than whites to be eligible for Medicaid. (In 1984, 25 percent of black women aged 15–44 had medical coverage through Medicaid, as compared with five percent of white women.¹⁷) The availability of Medicaid funding is associated with a higher abortion rate and ratio for both racial groups. This result may reflect either a real influence of access to Medicaid funding among low-income teenagers (more likely for black than for white teenagers), or an association between the state climate concerning abortion and availability of abortion services in general (more likely for white than for black teenagers). The index of nonrestrictive policies on abortion is also positively and significantly associated with the abortion rate for all teenagers and for blacks. Where a higher percentage of the population live in counties with providers of 400 or more abortions annually, which would tend to be in larger urban areas, abortion rates and (for white teenagers) ratios are significantly higher. The adult abortion rate has a similar pattern of relationships. Once again, the reader is reminded that these relationships may reflect both access to services and past demand for services because of a preexisting high level of unintended pregnancy.

• *Availability of physicians.* An index of the accessibility to teenagers of contraceptive services provided through private physicians was constructed. The index was based on the availability of private obstetrician-gynecologists and general and family practitioners in a state and their reported willingness to provide contraceptives to teenagers without parental consent. ‡

As may be seen in panel 5 of Table 3, where the index of availability of doctors is

*The measures of sex education in schools are based on data from urban school districts, requiring acceptance of the by-no-means certain assumption that the situation in urban school districts can be generalized to that in the state as a whole. In addition, data were available for only 34 states. It is also possible that sex education courses are intended as a response to already high teenage pregnancy rates, thus blurring any negative relationships that might exist. Given all these qualifications, it is not surprising that the analysis could uncover little relationship between school sex education and our pregnancy-related measures.

†That is, whether abortion was legalized later than 1969 and whether, as of 1980, minors had to obtain parental consent for abortion, and second-trimester abortions had to take place in a licensed hospital. (See: D. Bush, "Fertility-Related Laws Enacted in 1982," *Family Planning Perspectives*, 15:111, 1983; H. Ory, J. D. Forrest and R. Lincoln, *Making Choices: Evaluating the Health Risks and Benefits of Birth Control Methods*, AGI, New York, 1983, pp. 26–27, and P. Donovan, AGI, personal communication, 1986.)

‡This index is based on three items: the number of physicians per 100,000 population in 1980; the number of ob/gyns per 100,000 population in 1976; and the percentage of general or family practitioners, ob/gyns and pediatricians who are willing to provide contraceptives to minors without parental consent. The first two items were obtained from M. A. Strauss (see footnotes to Table 3), the third is from unpublished tabulations of the Survey of Physicians in Private Practice, conducted by the AGI in 1982.

Table 4. Among women aged 15-19, standardized beta coefficients for rates of pregnancy, birth and abortion, and the abortion ratio, by percentage of teenagers served in organized family planning clinics and various controls

% served and controls	Pregnancy rate			Birthrate			Abortion rate			Abortion ratio		
	Total	White	Black	Total	White	Black	Total	White	Black	Total	White	Black
1. 3 basic controls	0.28*	0.44**	-	-	-	-0.16	0.44**	0.58**	-	0.35**	0.42**	-
2. 3 basic controls plus 1970 teenage birthrate	-	0.18*	-0.18	-0.29**	-0.33**	-0.28*	0.43**	0.61**	-	0.48**	0.65**	-
3. 3 basic controls plus % in counties with large abortion providers	0.23	0.42*	-0.16	-	-	-0.15	0.39**	0.52**	-	0.33**	0.38*	-
4. 3 basic controls, 1970 teenage birthrate and % in counties with large abortion providers	-	-	-0.18	-0.29**	-0.32**	-0.27*	0.39**	0.54**	-	0.45**	0.60**	-

*p < 0.05.

**p < 0.01.

Source: For percentage of teenagers served, see reference 18; for other variables see Tables 2 and 3.

high, birthrates are low and abortion rates and ratios are high. There is no significant association of the physician index with pregnancy rates for any subgroup. These are not unexpected associations, since some physicians are likely to provide abortion services as well as family planning services.

Family Planning Clinic Services

As noted earlier, the available data are far from ideal for evaluating the effect of family planning clinic services on teenage pregnancy-related behavior. First of all, statewide measures of teenage sexual activity and contraceptive use, the two key determinants of pregnancy, are missing. Both of these unmeasured factors can be expected to affect both the rates of unintended pregnancy, birth and abortion and the level of use of family planning clinics. In addition, since publicly-funded family planning programs were directed toward low-income women (including those receiving public assistance and sexually active teenagers), efforts were made to establish family planning clinics in areas where there were already high rates of unintended pregnancy. Moreover, the level of the teenage birthrate was an important criterion in the formula used by the federal government to determine the regional allocation of funds to be set aside for services to teenagers.¹⁸ It is reasonable to assume that abortion services would also be established in areas with high pregnancy rates and birthrates. All of these factors can easily result in spurious relationships in cross-sectional models between family planning clinic use and rates of pregnancy, birth and abortion. An attempt was made in this analysis to utilize existing data to examine the relationships to the extent possible. The unavailability of data on sexual activity or contraceptive use, or on changes in teenage pregnancy over time, however, still clouds the findings.

Our measure of family planning clinic use

is the percentage of teenagers served by family planning clinics in 1980.¹⁹

The standardized beta coefficients showing the relationships between family planning clinic use and measures of teenage pregnancy, birth and abortion are shown in Table 4. The first row of the table shows the coefficients including only the three basic controls employed elsewhere in our cross-sectional model. The second row shows coefficients holding constant the 1970 teenage birthrate, one approach to controlling for the confounding association between birthrates and pregnancy rates and the location of clinics. Thus, it is possible to look at the relationship of use of clinic services and fertility, even where birthrates were high to begin with. Unfortunately, as we have noted, a similar "lagged" variable is not available for earlier rates of teenage abortion (because abortion was illegal in most states in the early 1970s) and, therefore, of teenage pregnancy. Thus, relationships with the abortion and pregnancy rates are still likely to be spurious. The third row adds to the three basic control variables a control for the percentage of the population living in counties with large abortion providers. This control is introduced because it is plausible that high levels of teenage pregnancies (84 percent of which are unintended at the national level²⁰) would stimulate provision not only of family planning services but of abortion services as well. The fourth row of the table controls simultaneously for all these factors—the basic control variables, the 1970 teenage birthrate, the 1980 availability of large abortion providers and the percentage of teenagers served.

It can be seen that controlling for the pre-existing birthrate (row 2) has strong effects on the relationship between program effort and pregnancy rates as well as birthrates, even though the control introduced reflects only the level of births, not the level of total pregnancies. The positive coefficients for preg-

nancy among all teenagers, seen in row 1, when only the three basic control variables are entered, become insignificant; the coefficient for white teenagers is greatly reduced; and among black adolescents, a small negative coefficient emerges. Most important, a significant *negative* association is found between the percentage of teenagers served and the teenage birthrate in 1980 for all three groups.

Row 3 of Table 4 shows that when the availability of services from large abortion providers is controlled for, the positive relationship of the percentage served with the pregnancy rate for all teenagers is no longer statistically significant, and the relationship is reduced among whites.

Row 4 shows the results when all of these controls are introduced simultaneously. The association of the percentage served with the birthrate continues to be strong and negative, while the association with the pregnancy rate is close to zero for the total group and for whites; and it is negative, though still not statistically significant, for blacks. In absolute terms, when all controls are introduced, in states where the proportion of teenagers served by family planning clinics is 10 percent higher, the total and white adolescent birthrate is 10 points lower, and the black teenage birthrate is 13 points lower. (The black teenage pregnancy rate is also 16 points lower, although this result is not statistically significant, probably because of the small number of observations.)

A negative relationship between the percentage of teenage patients served by family planning clinics and the teenage birthrate was found in an earlier analysis of counties for the mid-1970s, a finding that supports the results found here after controls are introduced for preexisting birthrate levels.²¹

The continued positive relationship of the percentage served with the abortion measures suggests dual responses to the problem

of unintended fertility—use of contraceptives to prevent pregnancy by some, and recourse to abortion to prevent births by others who have unplanned pregnancies. The lack of controls for state-specific sexual activity rates and for total proportions using contraceptives is doubtless muddying the relationships presented here. The pregnancy rate may have been even higher in the absence of family planning clinics. If it were possible to control for the 1970 pregnancy rate as we have for the 1970 birthrate, it would be possible to clarify the relationship between use of family planning clinic services and pregnancy rates.

• **1970–1980 fertility change.** Another approach to investigating whether a positive relationship between the percentage served by clinics and teenage birthrates is reflecting the placement of clinics in areas with high birthrates is to examine whether states in which there was a relatively large increase in the proportion of women served by family planning clinics between 1970 and 1980 also experienced a relatively large decline in teenage fertility during the decade. Because data on the number of teenagers served in 1970 are unavailable, change in the percentage of all women aged 15–44 served by family planning clinics between 1970 and 1980 was employed as the explanatory variable. (It is not possible to undertake a similar analysis of changes in pregnancy rates because, as we have noted, earlier measures of pregnancy by state are not available.) The three basic controls (percentage black, metropolitan and poor in 1980) were also included.

Change in the birthrate between 1970 and 1980 among all 15–19-year-olds, and among white and black teenagers, was the dependent variable. As the table below shows, after including the three basic controls, the greater the increase in the percentage of women served in family planning clinics between 1970 and 1980, the greater the decline in the birthrate among all teenagers, and among white and black teenagers considered separately. Regression results for birthrate decline are as follows:

Race	Standardized betas:	
	Controls plus change in % served	Controls, change in % served and large abortion providers
Total	0.53**	0.44**
White	0.46**	0.41**
Black	0.34*	0.29*

In absolute terms, an increase of 10 percent in the proportion of women aged 15–44 served between 1970 and 1980 was associated with a birthrate decline of about 27 points

for all teenagers—25 points for whites and 19 points for blacks.

An earlier analysis of counties also found that a rise in the percentage of teenagers enrolled in family planning clinics was associated with a more rapid decline in the teenage birthrate between 1970 and 1975.²² Similarly, an interstate analysis showed that increased use of contraceptive services provided by clinics was associated with an accelerated decline in the birthrate between 1970 and 1974.²³ Possibly, if information had been available on change in the pregnancy rate between 1970 and 1980, we would have seen similar declines (or smaller rises) in pregnancy over the decade in states with high levels of clinic attendance. Unfortunately, the data to test this hypothesis do not exist.

It is possible that an increase in availability of large abortion providers could also have contributed to the birthrate decline. There is no measure of change concerning this factor for the 1970–1980 period. However, the association was estimated by using availability of large providers in 1980 as a proxy for change. This involves making the not unreasonable assumption that states in which there was substantial availability of such providers in 1980 had had a substantial increase in availability during the decade. The results show that change in the birthrate was greatest where large abortion providers were most available, but the relationship between the increased percentage of women served and decreased birthrates remained significant for all teenagers, and for whites and blacks considered separately. The beta coefficients for the percentage of teenagers served (as shown above) declined only slightly, and remained significant in all three groups.

"High-Rate" and "Low-Rate" States

As noted in the discussion of Table 1, there are some half-dozen states in which adolescent birthrates and abortion rates are both relatively low, and another half-dozen in which both are relatively high. The former tend to be in the north central or midwestern parts of the country, the latter are largely in the South and West. Although the small number of states involved preclude multivariate analysis, the simple correlation coefficients show that the states with low rates have a good deal in common besides region, as do the half-dozen states with high rates.

As compared with states that have relatively high levels of pregnancy, abortion and birth, those with low rates have smaller populations, a smaller percentage of blacks and Hispanics and a lower proportion living in urban areas. These states experienced a smaller growth in total population between 1970 and 1980 and had more modest residen-

tial mobility. Poverty was also less prevalent in the states with low rates—especially as compared with the three high-rate states in the South. However, AFDC payments tend to be higher in the low-rate states. The low-rate states display a higher level of social, institutional and family integration. That is, the percentage of children living in female-headed households and the percentage of high school dropouts are lower; the percentage of high school graduates is higher; and the rate of teenage suicide is lower, as are the sales levels of sexually explicit magazines, the crime rate and the index of stress. The residents of low-rate states are less likely to be fundamentalists; women's status tends to be higher, as is political liberalism. Abortion services are less available in the low-rate states (possibly because of less demand). A smaller proportion of teenagers utilize family planning clinics, and the availability of private physicians is somewhat lower. These findings suggest that the general social milieu in which teenagers live is the most important factor associated with their rates of birth, abortion and pregnancy, and that use of contraceptives reflects the level of sexual activity in the population.

Discussion

By and large, the results of this analysis show that demographic, social and economic characteristics (which can also include educational attainment) are more important than policy measures in explaining the differences between states in the rates of teenage pregnancy, birth and abortion, especially among whites. Among black teenagers, this generalization essentially holds for birthrates, but is less true for pregnancy and abortion rates. Among white teenagers, with three exceptions, policy factors add, at most, 14 percent (but, more typically, 1–10 percent) to the variance already explained by the three control factors. In contrast, the demographic, social and economic factors add as much as 52 percent to the variance already explained, and many add more than 20 percent, with particularly strong effects for pregnancy and abortion rates (not shown).

The exceptions for white teenagers involve the association between sex education in high school and the pregnancy rate, the association between the availability of doctors and the abortion ratio, and that between Medicaid funds for abortion and the abortion ratio. A few policy factors are also more important than the socioeconomic variables for pregnancy and abortion rates among black teenagers. These are Medicaid funding for abortion and the availability of doctors (which add 16–25 percent to the variance explained for abortion rates and birthrates),

and some measures of AFDC availability (which add 16–25 percent to the variance for pregnancy rates and abortion rates).

For both whites and blacks, some policy variables are as important as social integration measures in their associations with abortion: The adult abortion rate, the availability of Medicaid funds for abortion and (for the abortion rate only) the index of nonrestrictive abortion policies all have strong associations with the level of abortion, in some cases, stronger associations than do the social integration factors. The availability of doctors and the percentage of the population in counties with large abortion providers have important associations with the black abortion rate, but make somewhat smaller though still significant contributions for white teenagers, relative to social integration measures.

However, few of the social integration measures have a significant association with the abortion *ratio* for whites (and none do for blacks). Thus, it would appear that poor social integration has little relationship with the probability that either white or black teenagers will choose to have an abortion.

The relatively small associations between the various social characteristics and the black teenage pregnancy, abortion and birth measures, as compared with such associations for whites, may reflect a low level of integration between the black population and the white majority group. It is also likely that our understanding of the factors that may influence pregnancy-related decisions among black teenagers is incomplete and that several factors have not been identified or measured. One interesting finding is that the availability of doctors and of large abortion providers and, especially, the availability of Medicaid funding for abortion have stronger associations with the abortion rate of black than of white teenagers. The finding concerning Medicaid is plausible, because a higher proportion of blacks are poor and eligible for Medicaid and may need public funding in order to obtain abortions. It is notable, in light of the greater significance of subsidized services for black teenagers, that in states where there are substantial public expenditures for family planning, the black teenage abortion rate is relatively low, even though not significantly so (not shown).

The results strongly suggest that AFDC programs with higher benefits and more

comprehensive coverage, which usually coincide with higher public spending in other areas and, probably, with better opportunities for teenagers, are not associated with high teenage birthrates.

Access to large abortion providers is associated with relatively high pregnancy rates, probably because services are more available where pregnancy levels—and, thus, the need for abortion—are higher. The significantly lower black teenage birthrates in states where Medicaid funds are available for abortion suggest that public funding of abortions makes a big difference in the level of childbearing among black teenagers.

The positive associations between the availability of subsidized contraceptive services and the abortion rate and ratio for white teenagers may well reflect the coexistence of multiple approaches to reducing teenage births in states where levels were already high. Moreover, subsidized family planning tends to be more available in states with wide availability of abortion services; both reflect high rates of unintended pregnancy.

Subsidized family planning clinics were more important sources of contraceptive services during the 1970s for black than for white teenagers. (In 1980, 27 percent of all black teenagers as compared with 13 percent of white teenagers attended clinics.²⁴) A strong association is nevertheless found between the increase in the percentage of women served by clinics and the decline in the teenage birthrate among both blacks and whites. Where the increase in the percentage served was greater, the decline in the birthrate was greater.

This analysis suggests that the broad social setting within which teenagers make or fail to make decisions about reproduction is of major importance in determining their chances of becoming pregnant, of having an abortion and of giving birth. A more stable family system, a more integrated community and social structure and a more liberal social climate are conducive to lower rates of teenage pregnancy and birth. Provision of contraceptive and abortion services does play a role in the overall picture: When factors that accompany a preexisting high birthrate are held constant, publicly subsidized family planning services are associated with lower birthrates in 1980. Moreover, the greater the increase in provision of publicly supported

family planning services during the 1970s, the greater was the decline in the teenage birthrate during the decade. However, abortion services were increasingly available in the same states that had higher levels of clinic service: There appears to be such a dual response in states that have the problem of high levels of teenage pregnancy. Nevertheless, after controlling for the availability of abortion services, a negative relationship is found between use of public family planning services and the level of teenage birthrates.

While the availability of both publicly supported family planning services and abortion services assists teenagers in controlling pregnancies and births, unintended teenage pregnancies, births and abortions continue to be unacceptably high, especially in states that have had high rates since the early 1970s. The heavy social costs exacted by teenage pregnancy are acknowledged, but there is disagreement on the means by which teenage pregnancy can be reduced. This analysis suggests that simultaneous advances are needed on many fronts.

Appendix 1: Data Issues

Birthrates are from publications of the National Center for Health Statistics (NCHS);²⁵ abortion rates are from the AGI and the Centers for Disease Control (CDC).²⁶ Data on abortions are collected by state departments of health and assembled by the CDC. State data are adjusted for undercounts, as determined by comparing the AGI's estimates, based on a national survey of all identified abortion providers, with the CDC's data.²⁷ However, data on abortions according to such characteristics as age and race are not available for all states. For a few states, the abortion rate for 15–19-year-olds has been estimated as a function of the abortion rate for women aged 15–44, which is justified by the high correlation ($r=0.95$) between teenage and total abortion rates.* Teenage abortion rates by race are available for only 32 states, and have not been estimated for the remaining 18 states.† This limitation applies also to pregnancy rates and abortion ratios. In addition, for the black subgroup analysis, states with black populations of under 50,000 are excluded, since all measures for blacks in these states would be unstable. This removes 10 additional states from the analysis of fertility rates for black teenagers.‡ As a result,

*The states for which the abortion rate for 15–19-year-olds was estimated are Alabama, Alaska, Connecticut, Florida, Iowa, Kentucky, New Hampshire, Texas, West Virginia and Wisconsin.

†Abortion rates for white teenagers were unavailable for Alabama, Alaska, Connecticut, Delaware, Florida, Iowa, Kentucky, Massachusetts, Michigan, Nebraska, New

Hampshire, Pennsylvania, Rhode Island, Texas, Washington, West Virginia, Wisconsin and Wyoming.

‡Abortion data for blacks were unavailable for the same 18 states as for whites, and for: Hawaii, Idaho, Maine, Montana, New Mexico, North Dakota, Oregon, South Dakota, Utah and Vermont, all of which have black populations of under 50,000. Missing states with large black

populations are Alabama, Florida, Michigan, Pennsylvania and Texas. States with a black population of 50,000 or more were included in the analyses of black teenage reproduction because, on average, a population this size would have about 2,500 teenage women, yielding 2,500 years of exposure in any given year as the denominator of a fertility, pregnancy or abortion rate. A denominator of this size should yield a reasonably reliable rate.

abortion rates, pregnancy rates and abortion ratios for the black population are available for only 22 states, compared with 34 states for the birthrate.

Means of the most important independent variables have been calculated for groups of states that have abortion data and for those that do not. No large differences have been found between states that were excluded because of the unavailability of abortion data and those that were included.

Appendix 2: Methodological Issues

Although a path-analysis approach, allowing for two-way relationships, would have been preferred for the analysis, given the small number of cases (ranging from 22 to 50) and the large number of factors that should be considered, such an elaborate model was considered inadvisable. The compromise reached was to apply a limited multiple regression model. The disadvantage of this procedure is that it does not allow for the portrayal or investigation of the complexity of the relationships that we know exist. This limited multiple regression procedure allowed the investigators to look at the association between the factors of interest and teenage reproduction after controlling for three contextual variables that precede and influence several of the independent and dependent factors, and that would be difficult to change by governmental effort without major modifications in federal or state policies. The aim of the analysis is to see whether factors other than the three basic controls have significant effects after the three are held constant. Because of the small number of cases in the study, introduction of more controls would have been problematic. Interpretation of the results is limited to inferences about associations between characteristics of the states and the state-level measures of teenage reproduction. It is not extended to imputing causation not only because it is not possible to control for all important factors but also because some independent factors may respond to, as well as influence, the dependent ones.

The three control factors are related to each other; the percentage poor is higher where the percentage black is higher ($r=0.51$), and the percentage poor is lower where the percentage metropolitan is higher ($r=-0.49$). The percentage black and the percentage metropolitan in the total popula-

tion are not strongly associated ($r=0.14$), but the percentage black is strongly associated with the percentage metropolitan in the black population ($r=-0.54$). In other words, in states where there is a higher percentage of blacks, a lower proportion of blacks live in metropolitan areas.

The multiple regression model considers the three contextual factors with each variable of interest added in one at a time. All four factors (the three controls and one other independent factor) are entered simultaneously with one of the dependent variables. One complication affecting the regression analysis is, as we have noted, that abortion data for some age and race subgroups and, therefore, pregnancy rates and abortion ratios, are missing.

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Estimating the Public Costs of Teenage Childbearing

By Martha R. Burt

Summary

A formula for making national, state and local estimates of the cost to the public of teenage childbearing is derived from a review of 12 studies. The formula is then applied to U.S. data. The calculations yield a single-year cost for 1985 of \$16.65 billion paid through three programs—Aid to Families with Dependent Children, food stamps and Medicaid—for women who first gave birth as teenagers. The calculations also show that the public will pay an average of \$13,902 over the next 20 years for the family begun by each first birth to a teenager in 1985 and \$5.16 billion over the same period for the families of all teenagers experiencing a first birth in 1985. If all teenage births were delayed until the mother was 20 or older, the potential savings to the public would be \$5,560 for each birth delayed and \$2.06 billion for the entire cohort of teenagers who would otherwise have had a first birth in 1985.

Previous Studies

Teenage childbearing has become an increasingly newsworthy topic as legislators, program officials and the general public have become aware of its tremendous social and financial costs. During the last decade, several attempts have been made to obtain reliable estimates of the financial costs of childbearing among adolescents. Most interest has focused on public costs—through Aid to Families with Dependent Children (AFDC), food stamps, medical assistance and social services; however, at least one study has also looked at private costs. Some studies have explored the costs of teenage childbearing at a national level; others have focused on a

single state, county or other local geographic area.

This article will review the 12 existing studies of the financial costs of teenage childbearing, and, on the basis of the approaches used to date, will develop a methodology for making consistent and comprehensive estimates of the costs to the public at the national, state and local levels. The methodology so derived will then be applied to U.S. data to obtain national estimates of the cost of teenage childbearing per year, per teenager's childbearing career and per cohort of teenagers giving birth in a single year.

The studies that are reviewed use varied methodologies, and they arrive at quite different cost estimates. Some studies calculate the public cost over a 20-year period for the family begun by a single teenage birth, as well as the total cost over the same 20-year period for the families begun by the cohort of babies born to teenagers in a single year. They ask, for example, what the childbearing career of a woman who has her first baby as a teenager in 1985 will cost the public by the time her first baby reaches adulthood. The model study of this type was conducted by SRI International for the Population Resource Center.¹ The study estimates that the family begun by each first birth to a teenager in 1979 would eventually cost taxpayers \$18,710 (in 1979 dollars) for household support; further, it estimates that all such families begun by first births to teenagers in that year alone would eventually cost taxpayers at least \$8.3 billion (in 1979 dollars). Throughout the rest of this article, such costs will be referred to as the "single-birth cost" and "single-cohort cost," respectively.

Other studies based on the same methodology include one for Mecklenburg County, North Carolina, and one for the St. Louis metropolitan area.² The Mecklenburg County study estimates the single-birth cost resulting from a child born to a teenager in 1979 to be \$13,852 (in 1979 dollars), and the single-cohort cost of all such births to be \$12

million. The St. Louis study estimates the single-birth cost for that metropolitan area to be \$17,675 (in 1981 dollars). The single-cohort cost is estimated at \$82 million (in 1981 dollars).

The methodology uses as its denominator all teenagers experiencing a first birth. Many of these mothers never receive welfare. The cost estimates are averages that spread the public cost arising from some teenagers over first births to all teenagers. Therefore, the estimates will be considerably lower than those that include only welfare recipients in their base.

Some studies estimate the total public outlay for families begun by teenage births in a given year, including expenses for families that were started when the mother was a teenager, even though she is now older. Only about 3–4 percent of the AFDC caseload at any time consists of families headed by women who are currently teenagers, but approximately half of AFDC households were started as a result of teenage births.³ Therefore, total public cost for a single year is very large. The model study of this type, conducted by The Urban Institute, estimates that the public spent \$8.55 billion in 1975 on AFDC, Medicaid and food stamps for families begun by teenage births.⁴ The researchers subsequently used simulation techniques to estimate a parallel figure for 1990. Expressed in 1982 dollars, that estimate comes to \$5.83 billion; it is considerably lower than the 1975 figure because of the institution of more restrictive eligibility criteria for welfare programs as a result of the Omnibus Budget Reconciliation Act of 1981. Finally, a parallel study for Monroe County, New York, arrives at estimates of \$26 million for 1977 and \$24 million for 1978.⁵ Figures of this type will be referred to as the "single-year cost" throughout this article.

A number of studies ask somewhat different questions. Two calculate costs only for the year in which the birth occurs and only for children whose mothers are 20 or younger

Martha R. Burt prepared the original study from which this article is derived while she was working as a consultant with the Center for Population Options; the work was supported by a grant to the Center from the Mary Reynolds Babcock Foundation. Burt is director of the Social Services Research Program at The Urban Institute, Washington, D.C.

at the time of the study.⁶ Three do not include the cost of one or more of the three major public programs (AFDC, Medicaid and food stamps) in all or part of their calculations.⁷ Three use only teenage mothers receiving public assistance or those designated in some way to be of low or marginal income as the denominator, rather than all teenagers giving birth, so that the cost estimated per birth is not adjusted for the probability of receiving welfare.⁸ All of these estimates may be important locally, but they are not as comprehensive as those derived from the more inclusive methodologies on which this article focuses. In addition, questions about the cost of a particular aspect of a program can always be answered by following the more comprehensive methodologies.

Of the studies reviewed for this article, only one attempts to calculate private as well as public costs.⁹ Children require expenditures whether or not they are born to teenagers. Generally, parents pay the expenses of raising their children, both in direct cash outlays and in opportunity costs.¹⁰ Businesses pay their share, too, through insurance for employees and their families, through taxes for schools and other services for children, through the costs of crimes committed by children, and so on. While there is nothing intrinsically wrong with trying to estimate private as well as public expenditures for children, the public focus remains the principal concern of policy-makers. Private costs are not included in the estimates presented in this article.

Assumptions Regarding Public Costs

The 12 studies vary in the assumptions they make about several critical dimensions of the calculations: which public costs to include; whether to base calculations only on teenagers who have a first birth during the year in question, or also on teenagers experiencing second and higher order births during that year; whether to base calculations on all teenagers experiencing a birth, or only on unmarried teenagers; whether to discount the cost in future years; whether to calculate marginal or full cost; and how many years to project. These issues are discussed below.

• *Which of the many relevant public programs are the most important ones to include in estimating the costs of teenage births?*² The three imperatives are AFDC, Medicaid and food stamps, since they constitute the largest public programs reaching the greatest numbers of households. After these three, other inclusions will depend on the availability of data and the researcher's conviction as to the magnitude of the cost and the policy importance of the service. A few of the additional costs calculated in some of the studies that

were reviewed include emergency and one-time payments for AFDC households; social services; job training; and housing. The single-birth and single-cohort estimates presented in this article include social services and housing costs.

The Monroe County study found that emergency and one-time payments amount to 13 percent of the combined cost of AFDC, Medicaid and food stamps.¹¹ Such payments may or may not be included in any AFDC expenditure figure obtained from local officials that would be used to calculate a single-year cost. They are almost certainly not included in any estimate of the average monthly benefit per recipient—the figure used in calculating single-birth and single-cohort costs. If state or local authorities make moderate or heavy use of these types of supplemental payments to AFDC households, a researcher estimating costs for that state or locality might want to ensure that such outlays are included.

Expenditures for social services buy many different things. In an Illinois study, social services mean special teenage pregnancy and parenting programs, and constitute a tiny proportion of total estimated costs.¹² In Mecklenburg County, this category means day care and school lunch programs.¹³ Social services amount to 15 percent of single-birth and single-cohort costs in SRI's calculations, but that study does not define what is included in the term.¹⁴ The St. Louis study simply adds five percent of AFDC costs for social services, without trying to develop estimates based on agency data.¹⁵

Foster care for the children of teenage parents is potentially very costly, and researchers making local estimates of single-year costs may want to include this type of program. The Illinois study cites an estimate by the Illinois Department of Children and Family Services that 20 percent of referrals for child abuse and neglect involve parents aged 19 and younger; nine percent of the referrals each year result in foster care, at an annual cost of \$4,800 per referral.¹⁶ New York has estimated that at least 20 percent of the children in its foster-care system were born to mothers who experienced their first birth as a teenager.¹⁷

However, the data necessary to include foster-care expenditures in single-birth or single-cohort costs (which are projections up to the child's adulthood) do not exist, because there is not enough evidence on what the probability is that a given teenage mother will have a child removed from her custody. One cannot, therefore, assign an expected value for the cost of foster care to a single individual. To do that, the researcher would have to know both the cost of the care and the

probability that the mother would need to use it.

Job training and housing costs are included in some studies. Job training is costly, but it usually occurs during a single year, and a very small proportion of teenage parents receive it. Housing costs have been calculated by estimating the proportion of public housing units occupied by households that were established as a result of a teenage birth—a proportion that amounts to five percent, according to the SRI and St. Louis studies.¹⁸ In these two studies, housing costs are between one and two percent of total AFDC expenditures. While expenditures for public housing are relevant, so are rent subsidies for private housing, which may cost as much as or more than public housing. Neither cost may be worth calculating from agency data, and estimates based on assumptions about their magnitude may be the best approach.

• *Should the denominator consist only of teenagers experiencing a first birth, or should it include all teenagers giving birth that year, regardless of parity?* Twenty-three percent of all teenagers giving birth in 1984, for example, were having a second, third or even fourth child.¹⁹ Only teenagers experiencing first births, however, are used for the estimates presented in this article. Probabilities of subsequent births are calculated for teenagers having their first birth at various ages, and the costs associated with subsequent births are added to the cost of the first birth, to produce an estimate covering the period for which expenditures are projected. This approach focuses on the teenager's childbearing career: A first birth in adolescence triggers a chain of events, some of which entail public cost. Second and higher order births are part of that chain of events, in that an early first birth increases the probability of subsequent fertility.

• *Should births to all teenagers or only to unmarried teenagers be included?* All the studies reviewed for this article, and the national estimates for 1985 presented later, include births to all teenagers. Teenage mothers, whether they marry or not, have a statistically higher probability of receiving welfare at some time in their lives than do women who delay childbearing. Loss of schooling and higher subsequent fertility accompany all teenage childbearing, not just that among unmarried adolescents; indeed, these consequences are more pronounced among teenagers who marry.²⁰ The two factors reduce the mother's ability to support herself and her children, and increase public-sector costs.

• *Is a dollar tomorrow worth a dollar today?*² The answer is no; a dollar, if invested rather than spent today, will be worth more tomorrow.

row. Discounting deflates projected costs by the amount a dollar invested today could earn (compounded, minus inflation) by the time it is needed to cover the future cost of supporting families begun by teenagers. Discounting is only relevant when calculating single-birth and single-cohort costs and is used in this article only for those estimates. It does not apply to single-year cost, since the year for which one is making the estimate is the present one, and the present value of a dollar is the appropriate figure to use.

• *Should one calculate the actual cost to the public of a teenage birth, or the difference in public cost between a teenage birth and a later birth?* The issue arises because approximately one in 10 women who wait until after their teenage years to begin childbearing also receive public support.²¹ In addition, even the best interventions are likely only to delay an initial teenage birth, not prevent it entirely, although subsequent births may be prevented altogether. This article calculates both the total cost of a teenage birth and the marginal cost—the difference between what the public pays for a teenage birth and what it pays for a delayed birth. The total cost is important because it tells how much cash the public will have to lay out both now and in the future. The marginal cost is not quite as large, but presents a more realistic picture of what the public would save if the birth were delayed. Through computer simulation, an Urban Institute study estimates that a 50 percent reduction in births to women aged 19 and younger would reduce the 1990 single-year public cost by 20 percent. Total elimination of births to unmarried women 17 and younger would reduce the 1990 cost by 17 percent, and a 50 percent reduction in births to these young women would reduce it by 10 percent.²² There is no one-to-one relationship between teenage childbearing and public cost, because teenage births in these simulations, as in reality, are mostly delayed rather than eliminated, and because factors associated with poverty still characterize the lives of many teenagers, even when the computer simulation artificially prevents them from having births. These factors eventually lead to public dependency for some proportion of teenagers.

The marginal cost is, thus, a very important figure to calculate, but it is not easy to estimate adequately what proportion of the cost is marginal. The model this article presents uses 40 percent of the full cost of teenage childbearing as the marginal cost associated with a teenage birth as opposed to a birth occurring at age 20 and older. The 40 percent figure was developed by assuming no births to teenagers and by doubling the 20 percent savings that The Urban Institute estimated would be achieved by a 50 percent reduction in births to mothers younger than 20. Therefore, the public could expect to save 40 percent of the full cost of teenage births by eliminating teenage births altogether.

• *For how many years are the teenager and her family potential recipients of public support, following the birth of her first child?* The base number of years would be 18, representing the age at which a child born to a teenager would no longer be a minor, and would no longer be eligible for welfare. The SRI study used 20-year projections, however, because the levels of subsequent fertility known to be associated with teenage births—30 percent experience a second pregnancy within two years of a first birth²³—suggest the possibility of public support during the growth to adulthood of more than one child.

The model outlined in this article also makes 20-year projections, but using a shorter period would be acceptable if good reasons for doing so exist and if the number of years covered by the calculation is always made clear. One might, for example, project only 10 years after the first birth, both because most medical costs occur in those years and because the probability of receiving welfare diminishes in the second decade after a teenage birth.

1985 Single-Year Costs

The single-year costs in 1985 for the three major public programs are shown in Table 1. Total AFDC expenditures for 1985—almost \$16 billion—have been obtained from U.S. budget estimates and include administrative costs.²⁴ To derive total food stamp expenditures for AFDC recipients, the average monthly food stamp allocation per individual

Table 1. Estimates of public outlays for AFDC, food stamps and Medicaid paid to all recipients and to families begun by a teenage birth, 1985

Program	All recipients (in billions)	Teenage mothers (in billions)
Total	\$31.40	\$15.85
AFDC	15.69	8.32
Food stamps	6.45	3.42
Medicaid	9.26	4.91

in 1984 (\$42.80)²⁵ is increased by two percent (to \$43.66) for 1985.* This figure is multiplied by 12 to obtain an annual estimate, and administrative expenses of 12 percent are added.²⁶ The result is then multiplied by the estimated number of Medicaid recipients who were on AFDC in 1985,²⁷ and adjusted for the 75 percent participation rate of AFDC households in the food stamp program.²⁸ These procedures produce an estimate of more than \$6 billion in food stamp expenditures for AFDC households.

Medicaid expenditures are estimated in a similar fashion. First, annual average costs of \$889 per AFDC adult and \$435 per AFDC child in 1985 have been derived by inflating the 1984 figures by five percent.† Administrative expenses of five percent are added next.²⁹ These average costs are then multiplied by the number of AFDC adults (5,381,000) and AFDC children (9,285,000) receiving Medicaid in 1985.³⁰ The result is an estimate of more than \$9 billion in Medicaid expenditures for AFDC families.

The second column of Table 1 shows the 1985 public outlay through these three programs attributable to families established as a result of teenage childbearing. The total outlay of nearly \$17 billion indicates that families started by a teenage birth absorb approximately 53 percent of total public expenditures. This finding is conservative, since several other studies have produced estimates ranging from 50 to 60 percent.³¹ The figures in the table include both direct payments to individuals and the administrative costs of the three programs. If administrative costs were excluded, the estimate would be \$15.08 billion.

*Per-recipient food stamp allocations are indexed to the food component of the Consumer Price Index; increases in food stamp allocations have averaged 2-3 percent a year. Thus, using two percent as the factor for inflating the 1984 average figure per recipient produces a conservative estimate.

†So that estimates of Medicaid and food stamp expenditures would be based on the same number of AFDC recipients, the number of Medicaid recipients who are on AFDC is used as the basis for calculating both Medicaid

and food stamp costs. The food stamp estimate is then adjusted for the participation rate of AFDC households in the food stamp program.

[The 1984 data were obtained from the Medicaid Hotline (301-597-1417). The figures used are Medicaid costs for AFDC recipients exclusively, and do not include any costs associated with Supplemental Security Income or elderly Medicaid recipients. The Consumer Price Index for hospital-based medical care (inpatient and outpatient combined) has increased an average of

11.6 percent per year over the past eight years. Medicaid expenditures have increased an average of 12.1 percent annually during the same period (see: Committee on Ways and Means, 1985, op. cit., Appendix E, Table 1, reference 3). However, these inflation figures are for all hospital and Medicaid users. The population includes elderly non-AFDC individuals, who are probably responsible for a disproportionate share of the increase in expenses. Consequently, using a five percent inflation factor seems a reasonable and conservative approach.

Table 2. First births to teenagers in 1985, consequent public costs, and potential savings associated with delaying such births

Age at first birth	No. first births	Public costs		Savings	
		Single birth	Single co-cohort*	Single birth	Single co-cohort*
All	371,131	\$13,902	\$5.16	\$5,560	\$2.06
<15	9,638	17,724	0.17	7,089	0.07
15-17	144,308	17,689	2.55	7,076	1.02
18-19	217,185	11,214	2.44	4,485	0.97

*In billions of dollars.

Probably the only comparison figure available is the 1975 Urban Institute estimate of \$8.55 billion. (That figure does not include administrative costs, which would add another \$0.88 billion.) Inflating \$8.55 billion to a 1985 equivalent using the Office of Management and Budget deflator, which incorporates actual inflation rates, yields an estimate of \$16.33 billion (\$18.01 billion with administrative costs added).³² This method probably results in an overestimate, since public expenditures have not always been allowed to rise with inflation.

Inflating \$8.55 billion in 1975 dollars using a factor of 1.79 (which is the 1975-1985 actual growth in average monthly payments to AFDC recipients) yields an estimate of \$15.34 billion. This figure compares well with the author's estimate, excluding administrative costs, of \$15.08 billion for 1985. Medicaid expenditures grew at a faster rate than did AFDC outlays, so this is probably a conservative estimate. Thus, the single-year costs estimated for 1985 appear to be well within the bounds of probability compared with other ways of estimating the same expenditures. In addition, the 1985 figure of \$16.65 billion includes only the sums expended in the three major programs. Not included are other services that are more likely to be used by families begun by a teenage birth than by other families, such as publicly supported social services, housing, special educational programs, foster care and child protective services. Many of these figures are not available nationally, and may not be available locally, so \$16.65 billion is a minimum figure.

Single-Birth and Single-Cohort Costs

To estimate single-birth and single-cohort costs, which are projections over a 20-year period, researchers must make a number of assumptions in addition to those already discussed. For example, since the projection traces a teenager's childbearing career from the time of her first birth, and counts subse-

quent children and their associated cost as part of the cost of the initial birth, some assumptions about the number and timing of subsequent births are necessary. Estimates made by The Urban Institute are used for that purpose.³³ The estimates are that teenagers who have their first baby at age 17 or younger will have 2.1 children by age 22, 2.8 children by age 27 and 3.2 children by age 32. Women whose first child is born when they are 18 or 19 will have 1.6 children by age 22, 2.4 by age 27 and 2.8 by age 32. These figures are used to calculate annual average increases in family size, which in turn are used when calculating the number of household members eligible for AFDC, food stamp and Medicaid support and when adding extra medical expenses for pregnancy and childbirth.

The computation of the number of household members eligible for public benefits is based on the assumption that no one 16 or younger heads her own household, but that all women 20 and older head their own households. With respect to the intermediate ages, it is assumed that 25 percent of 17-year-olds, 50 percent of 18-year-olds and 75 percent of 19-year-olds head their own households.

In this article, 0.34 is used as the probability that teenage mothers will receive welfare between ages 15 and 19.* At age 20 and older, the probability depends on the age of the woman at the time of first birth. For women whose first child was born when they were 17 or younger, the probabilities are 0.20 when they are 20-24, 0.16 when they are 25-29 and 0.02 when they reach 30 and older ages. For women 18 or 19 at first birth, the comparable probabilities are 0.15, 0.09 and 0.03.³⁴

Application of these probabilities is quite straightforward if one is estimating costs only for 18-year-olds or only for 15-year-olds. However, in the current methodology, we combine young women aged 15-17 and 18-19 to arrive at an estimated cost. This approach requires some adjustments of the probabilities applicable to the transition years. For example, among 15-17-year-olds, the 17-year-olds will turn 20 in the fourth year of the projection and will be subject to a 0.20 probability of receiving welfare; the 15-16-year-olds, however, will be only 18-19 in the fourth year, so the 0.34 probability of receiving welfare will still be applicable to them. Therefore, the probability used for the fourth year of the projection will be the average of the probabilities for each age weighted by the proportion of the group at each age. The same sort of adjustment must be made for each year that part of the group is old enough for the next applicable probability, but part of the group is not.

The probabilities of receiving AFDC among women 20 and older are 4-15 percent lower than those used in the SRI study (the actual proportion depends on the woman's age and age at first birth), because the present estimates reflect the more restrictive criteria that were set for welfare eligibility by the Omnibus Budget Reconciliation Act of 1981.

Inflation is assumed to average five percent per year over the 20 years of the projection. Money invested in 1985 is assumed to grow at a real interest rate of four percent annually after allowing for inflation. Thus, four percent compounded annually is used as the discount rate. This practice follows the discounting procedure used by SRI International.³⁵

The number of first births to teenagers is taken from 1984 natality data,³⁶ which are the latest available. The figures for 1985 are assumed to be the same and are shown in the first column of Table 2. The table also presents estimates of the total public outlay over the 20-year period from 1985 to 2004 for a woman who had her first birth as a teenager in 1985 (single-birth cost) and for all women who first gave birth as teenagers in 1985 (single-cohort cost).

The single-birth cost of \$13,902 can be compared with SRI International's estimated \$18,710 for a first birth in 1979, with the estimate of \$17,675 for a first birth in St. Louis in 1931 and with the estimate of \$13,852 for a first birth in Mecklenburg County in 1979.³⁷ All other things being equal, one would have expected the 1985 estimate to be higher than any of these earlier estimates, simply because of inflation. The major reason for the 1985 estimated cost being lower is that a teenager's probability of receiving public assistance was reduced, because of the more restrictive eligibility criteria that were introduced in the Omnibus Budget Reconciliation Act of 1981. Thus, changes in the availability of welfare support make a substantial difference in the long-term fiscal consequences of teenage childbearing. Single-birth costs were multiplied by the number of teenagers who experienced first births in 1985 to arrive at the single-cohort costs.

The table also presents the potential savings to the public if all teenage births were

*The 0.34 figure is derived by weighting the AFDC probabilities estimated by Kristin Moore for teenagers experiencing first births at different ages by the proportion of teenagers of each age represented in the 1984 first-birth statistics and the number of teenage years remaining to them after the first birth (see: K. A. Moore, 1978, op. cit., reference 21). A single probability figure for all teenagers throughout their teenage years of dependency on AFDC was sought to simplify calculations.

Figure 1. Worksheet for calculating single-birth cost

1. Age at first birth (check one):	14 or younger		15-17		18-19					
2. Year after first birth	1	2	3	4	5	6	7	8	9	10
3. Age that year	15-17	16-18	17-19	18-20	19-21	20-22	21-23	22-24	23-25	24-26
4. AFDC cost										
5. Food stamp cost										
6. Medicaid cost										
7. Social svcs. & housing (7% of 4)										
8. Admin. cost (12% of 4 & 5)										
9. Admin. cost (5% of 6)										
10. Total (4-9)										
11. Probability of welfare	0.34	0.34	0.34	0.27	0.22	0.20	0.20	0.20	0.18	0.17
12. Total (11 x 10)										
13. Discount factor	1.00	0.96	0.92	0.89	0.85	0.82	0.78	0.75	0.72	0.69
14. Yearly full cost (12 x 13)										
15. Yearly potential savings (40% of 14)										

delayed until the mother was 20 or older—the so-called marginal costs of teenage childbearing. The savings—\$5,560 for a single birth and \$2.06 billion for the cohort—are only 40 percent of total cost, reflecting the fact that even with delayed births and a potentially smaller family size, many women are still likely to need welfare.

Calculating Public Costs

A sample worksheet for calculating single-birth costs is shown in Figure 1. The worksheet applies to the first 10 years only; two such worksheets would be needed to calculate 20-year costs. The example given here is for women 15-17 years of age. Separate worksheets must be completed for other age-groups.

The age of the mother at first birth is checked on line 1, and her age during each year of the projection is entered on line 3. AFDC, food stamp and Medicaid costs in 1985* should be adjusted for the 20 years of the projection, to accommodate their anticipated failure to keep pace with inflation.† The adjusted figures are then multiplied by the anticipated number of family members receiving benefits in each year, and the re-

sults entered on lines 4-6 for each year. Social services and housing costs (seven percent of AFDC cost) and administrative expenses (12 percent of AFDC and food stamps and five percent of Medicaid) are calculated next and entered on lines 7-9.³⁸

Lines 4-9 are then totaled for each year after first birth. The total is adjusted for the probability that the woman is receiving AFDC (in this example, the probabilities have already been calculated according to the proportion of women at each age and have been entered on line 11), and then must be adjusted for the discount factor (entered on line 13). The result is the yearly cost for one birth. All figures on line 14 are added to arrive at the single-birth cost for a 10- or 20-year period. Multiplying either the yearly cost or the figure for the entire period by 40 percent produces the potential savings in that year or over the period of the projection.

Once a worksheet has been completed for a single teenager in each age-cohort (e.g., 14 and younger, 15-17 and 18-19), the cost for all teenagers in each cohort can be obtained by multiplying the single-birth cost by the number of first births to teenagers in that cohort for that year. The cost for all teenagers

experiencing first births in that year is then the sum of the costs for each age-cohort.‡

Discussion

This article has reviewed 12 available studies that estimate public costs attributable to teenage childbearing. The studies use very different methodologies, and a primary purpose of this article has been to extract some basic principles for making such estimates. These principles serve as the basis for the national estimates presented, and they double as recommendations to local planners interested in making similar estimates for their own populations.

The final figures derived from any analysis of public costs will always depend on the assumptions made. The estimates will increase if one assumes more births, and more closely spaced ones, following the first birth; if one assumes a higher rate of welfare participation during each year of the projection; if one assumes that inflation is lower or that increases in government outlays relative to inflation are higher; if one limits the analysis to poor and marginal-income teenagers, who would be expected to have higher rates of welfare dependency than all teenagers; or if

*The AFDC cost figure per recipient is \$113 per month (see: Committee on Ways and Means, 1985, op. cit., Section 8, Table 17, reference 3). Figures for food stamps and Medicaid are given earlier in the text. Costs to Medicaid of pregnancy and childbirth are estimated at \$3,107 for a birth to a teenager 14 and younger, \$2,967 for a birth to a 15-17-year-old, \$2,397 for one to an 18-19-year-old and \$2,446 for a birth to a woman 20 and older.

†AFDC is reduced by 3.2 percent per year, based on the assumption that the annual inflation rate will be five percent, whereas the annual increase in AFDC will only be 1.8 percent (see: Committee on Ways and Means, 1985, op. cit., Section 8, Table 17, reference 3). Food stamp cost is reduced by three percent per year, based on the assumption of a five percent inflation rate and a two percent increase in the food stamp allotment per recipient. Medicaid expenditures are not adjusted, be-

cause the anticipated five percent inflation rate and five percent growth rate in Medicaid expenditures cancel each other out.

‡A manual that local authorities can use to assist them in calculating these costs has recently been published: M. R. Burt and D. Hafner, *Teenage Childbearing: How Much Does It Cost?* Center for Population Options, Washington, D.C., 1986.

one includes additional categories of costs in the analysis.

What is critically important when developing estimates of this kind is to make the underlying assumptions clear, since so much rests on them. Clearly stated assumptions make it feasible to compare estimates derived from a number of different studies. In the national estimates presented in this article, for instance, 20-year projected costs are considerably lower than similar estimates made with data applicable to the years before 1982, because they incorporate the lower welfare participation rates that followed from 1981 legislative changes made in the eligibility for AFDC.

Estimates of public outlays for teenage childbearing often attract a great deal of attention in the media, at both the national and the local level. Such estimates are time-consuming but not difficult to calculate, and enough is known about how to make them that such figures should become readily available to policy-makers and program-planners throughout the United States.

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Risk Factors for Uterine Fibroids Same as Those For Endometrial Cancer, New Pill Study Finds

Women who use the pill are at reduced risk of developing uterine fibroids; the risk decreases with duration of pill use and possibly with the use of oral contraceptives high in progestogen. Two other factors protective against the growth of fibroids are smoking and an increasing number of term pregnancies. However, the risk rises with increasing body weight. All these factors are also associated—in the same directions—with a woman's risk of developing endometrial cancer. "Unopposed" estrogen—already identified as a major factor associated with the development of endometrial cancer—may also be associated with the development of uterine fibroids. These are the major findings of a recent analysis of data on uterine fibroids from the Oxford Family Planning Association study.¹

About 17,000 women were recruited for the Oxford study between 1968 and 1974. At the time of recruitment, all of the women were married, were between the ages of 25 and 39, and were using oral contraceptives, the diaphragm or the IUD. As of July 1985, 538 women had developed uterine fibroids. Of these women, 535 entered the fibroid study as cases. The researchers selected an equal number of controls, who were matched with cases by date of entry into the study, age and family planning clinic attendance. Detailed reproductive histories, including information on pregnancies, abortions and contraceptive use were available for both cases and controls. These histories are updated annually.

Findings

The investigators found a steady rise in the incidence of fibroids with increasing age up to age 50. Fibroids were uncommon among women under the age of 30; they were three times more likely to occur among women in their 40s than among those in their 30s.

Menopause was associated with a considerably reduced risk of fibroids: Only three of the patients with fibroids were postmeno-

pausal compared with 17 of the controls. This finding was consistent with a fall in the incidence of fibroids among women after the age of 50, according to the researchers.

A woman's risk of developing fibroids decreased with each term pregnancy (both live births and stillbirths). The investigators found that women with five term pregnancies ran only a quarter of the risk that women with no term pregnancies ran. In addition, they found that the older the woman at her last term pregnancy, the lower her risk of developing fibroids.

Women with fibroids were more likely to have had incomplete pregnancies than were women in the control group: Fifteen percent of all case pregnancies ended in spontaneous or induced abortion compared with 11 percent of all control pregnancies. Moreover, during follow-up it was discovered that there had been fewer pregnancies among the women with fibroids than among those in the control group.

A smaller proportion of women with fibroids than of the controls had used oral contraceptives (53 percent and 59 percent, respectively). Further, a woman's risk of developing fibroids declined consistently with increasing duration of pill use. The investigators found a roughly 17 percent reduction in risk with each five years of oral contraceptive use. Reduction in the risk of developing fibroids appeared to be associated with the amount of progestogen in the pill: The higher the dose of progestogen, the more protection it afforded.

The researchers found that both weight and cigarette smoking were also related to a woman's risk of developing fibroids. The risk increased steadily with increasing weight: Women who weighed more than 70 kilograms at the time of recruitment were three times more likely to develop fibroids than were those who weighed less than 50 kilograms. Conversely, the risk was lower among smokers than among nonsmokers: Women who smoked 10 cigarettes a day had an 18

percent decreased risk compared with nonsmokers.

The investigators believe that the negative association between the number of term pregnancies and the risk of fibroids is probably due to a combination of the relative infertility of women who develop fibroids and the possibility that term pregnancies per se reduce the risk. Their finding that the risk of fibroids is further reduced with each additional term pregnancy lends weight to the latter possibility, they contend. Moreover, because the pregnancies among the fibroid group ended in abortion more often than the pregnancies among controls, and because cases reported infertility problems more often during follow-up, the researchers conclude that fibroids may contribute to infertility by blocking implantation or by preventing maintenance of the ovum in the uterus in some cases.

All of the risk factors for uterine fibroids that have been identified in this study are the same as those identified for endometrial cancer, according to the researchers. They conclude that since "unopposed" estrogen—that is, exposure to estrogen unaccompanied by progestogen—is a major factor associated with endometrial cancer, it may also be an "underlying cause of fibroids." The decreased risk of fibroids associated with term pregnancies and with the use of oral contraceptives high in progestogen might possibly be explained by the estrogen-modifying effect of progestogens, they contend. However, the investigators underscore the need for future research to test this hypothesis by finding out whether fibroids are particularly prevalent among women with endometrial cancer and by determining why the use of estrogen replacement therapy by postmenopausal women does not appear to increase the risk of fibroids.

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UK: Maternal Mortality Rate Is Low, but Many Deaths Are Preventable

Maternal mortality continues to decline in England and Wales. A recently released report containing data from 1979–1981 shows that there were seven maternal deaths per million women aged 15–44, compared with 14 per million between 1970 and 1972. Between 1979 and 1981, the most common direct cause of maternal mortality was hypertensive disease. Other important primary causes of maternal mortality were pulmonary embolism, anesthesia-related complications, ectopic pregnancy and amniotic fluid embolism. Overall, one in five deaths were related in some way to cesarean section, and around one in 20 were directly associated with spontaneous or induced abortion. Many of the deaths were attributed by the investigators to poor medical care; thus, while maternal mortality rates are lower than ever, a substantial proportion of maternal deaths remain preventable.¹

British health authorities investigate each death that is either known or suspected to have been related to a woman's pregnancy. Special inquiry forms are dispatched to all medical staff involved in the woman's medical care, and senior consultant obstetricians forward this information to the Department of Health and Social Security. The reports are then evaluated and specific causes of death are attributed. These data have been collected and released for three-year periods, beginning with the period 1970–1972.

In the period 1979–1981, there were 299 maternal deaths that occurred either during pregnancy or in the 42 days following childbirth. Direct maternal deaths (i.e., those resulting directly from obstetric complications during pregnancy, labor and the postpartum period, or from omitted or incorrect medical treatment) represented 59 percent of maternal deaths, and indirect maternal deaths (those stemming from preexisting disease or from a disease that developed during pregnancy but was not directly related to it) accounted for 31 percent of pregnancy-related mortality. The remaining 10 percent were classified as being unrelated to pregnancy. Eighty-one percent of maternal deaths were among married women, and 26 percent of all deaths took place before 25 weeks of gestation.

There were seven maternal deaths for every million English and Welsh women of reproductive age in 1979–1981, approximately the same level as in the previous three-year period. However, this rate was substantially lower than that observed in 1970–1972, when there were about 14 mater-

nal deaths for every million women aged 15–44.

The direct maternal mortality rate in 1979–1981 was 92 deaths per million women who gave birth. Levels of direct mortality were lowest among 20–24-year-olds (58 deaths per million) and highest among women 40 or older (544 deaths per million). The death rate climbed steadily with the woman's age, except that the rate among teenagers who gave birth (90 per million) was considerably higher than that found among 20–24-year-olds. With regard to parity, women having their second child had the lowest mortality rate (76 deaths per million), followed closely by those having their first birth (84 per million); beyond two births, rates of direct maternal mortality rose steadily by parity. The investigators estimate that almost 25 percent of the reduction in maternal deaths between 1970–1972 and 1979–1981 may be attributable to a decline in the fertility of women in England and Wales.

Causes of Death

Of the 176 women whose deaths were directly related to childbearing, 36 died as a result of hypertensive diseases of pregnancy (preeclampsia and eclampsia). These diseases were the single most important cause of death, especially among older women: Mortality from hypertensive diseases among those over age 35 was 50 deaths per million women who delivered, compared with 17 per million among those 35 or younger. Overall rates of maternal mortality from hypertensive diseases do not appear to have changed since 1970. The authors of the report attribute 75 percent of the deaths from hypertensive diseases to substandard medical care and comment that such levels of mortality are "particularly unsatisfactory," given the ability of modern obstetrics to prevent such deaths.

Embolisms were another important direct cause of maternal mortality: Twenty-three women died of pulmonary embolisms—11 while pregnant, one during labor and 11 after delivery. This was the lowest number of such fatalities since 1970. In addition, 18 deaths were attributed to amniotic fluid embolisms; in each of these cases, symptoms first appeared during labor. The report notes that at least three of the amniotic fluid embolisms were associated with uterine rupture following the administration of drugs to induce or augment labor, raising the possibility that "uterine contractions may have been more excessive than was appreciated or reported." The authors emphasize that such treatment should be closely supervised to ensure that uterine rupture and amniotic fluid embolism are avoided.

Twenty maternal deaths were the direct result of an ectopic pregnancy; the associated mortality rate was eight deaths per million pregnancies. The authors of the report comment that nonwhite women appear to be three to four times more likely to die from an ectopic pregnancy than are white women; of 170 deaths from ectopic pregnancy that have occurred in England and Wales since 1964, 52 have been among nonwhite women. Ectopic pregnancy was properly diagnosed in only seven of the 20 deaths in 1979–1981; in six cases, the diagnosis was delayed or the condition was misdiagnosed; and in the remaining seven cases, ectopic pregnancy was completely unsuspected. According to the authors, a high degree of suspicion on the part of health professionals and timely treatment are the only ways in which some of these deaths might be averted.

A total of 22 women died as a result of complications directly attributable to anesthesia: Ten deaths were from pulmonary complications, six were due to cardiac complications and six were related to central nervous system complications. According to the report, of the eight anesthesia-related deaths resulting from inhalation of the contents of the stomach, seven were attributable to substandard postoperative care. In eight deaths, the anesthesiologist intubated the patient incorrectly. The authors also point out that 11 of the women who died of anesthesia complications were nonwhite; it is suggested that medical staff did not react quickly enough to oxygen starvation among these women because the skin color changes characteristic of oxygen deprivation were harder to detect.

Fourteen women died as a direct result of abortions—six from spontaneous or missed abortions, five from legal abortions, one from an illegal abortion and two from abortions of unknown types. Between 1970 and 1972, the period immediately preceding the legalization of abortion in Great Britain, 71 maternal deaths were directly related to induced abortion, compared with only six in 1979–1982. Furthermore, illegal abortion deaths fell from 37 in 1970–1972 to one in 1979–1982.

Finally, of the remaining cases of direct maternal deaths, 14 women died of hemorrhage, six died of infection and 23 died of other causes (including uterine rupture and liver disorders).

Cesarean Sections

Although the mortality rate from cesarean section has fallen steadily, the procedure still was involved in a relatively large proportion of maternal deaths. In all, 87 women died either during or following a cesarean section—59 were direct maternal deaths, 25 were indirect and three were unrelated. The

overall mortality rate for cesarean sections in 1979-1981 was 0.4 deaths per 1,000 operations, compared with 0.8 per 1,000 in 1970-1972. This decline occurred during a period in which the proportion of cesarean sections that were actually performed rose from five percent to nine percent of all deliveries.

As might have been expected, the mortality rate for emergency cesarean sections was four times higher than the rate for elective procedures (0.8 compared with 0.2 deaths per 1,000 operations). Seventy percent of the deaths occurred following emergency procedures. The report suggests that hospitals should have better procedures for preparing patients for cesareans on short notice and should encourage closer consultation between obstetricians, anesthesiologists and midwives in high-risk cases. "In many instances," the authors comment, "the decision to perform a cesarean section appears to have been taken too late."

Type of Care

A total of 41 women who died during the three-year period had made no pregnancy-related medical visits. In 26 of these cases, either the duration of the pregnancy was unknown or the woman died in the first 12 weeks of pregnancy (which makes their failure to seek care understandable). Four other women died during the course of legal or spontaneous abortions. Of the remaining 11 women, eight died as a direct result of pregnancy-related hypertensive disease; six of these eight women had concealed their pregnancies. The other three women died of hemorrhage; each of these women had given birth at home, unattended. According to the authors, this finding "clearly illustrates the great hazards both of hypertensive disease and of pregnancy concealment for women who made no arrangement for their [delivery]."

The authors of the report conclude that the

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risk of maternal mortality has been greatly reduced in England and Wales during the past 20 years. The factors that at one time were the principal causes of death—hemorrhage and abortion—now represent only about 16 percent of all maternal deaths. However, they conclude, many of the deaths examined could have been prevented if doctors and hospitals had provided better medical care.

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The Effectiveness of the Cervical Cap Is Hampered By Problems of Dislodgement and Rubber Erosion

A group of well-educated Toronto women using the cervical cap registered pregnancy rates of 17 percent at the end of one year of use and 38 percent at the end of two years, according to a recent study.¹ Failure of the method was related to dislodgement of the cap during sexual intercourse. Caps used consistently for a year or repeatedly left in place for longer than three days evidenced marked deterioration, which may also have increased the risk of pregnancy. The investigators suggest that this risk might be reduced if the manufacturer improves the cap's durability and fit by using better materials and increasing the number of sizes available.

Between May 1981 and November 1983, 617 women attending the Bay Center for Birth Control in Toronto volunteered to be fitted with a cervical cap. Of the original participants, 101 were lost to follow-up and were excluded from the analysis. The study sample consisted, therefore, of 516 women, 438 of whom returned to the center for at least one recommended checkup, and 78 of whom responded to a mailed questionnaire. Most of the participants were from Toronto and its environs. Their mean age was 29, making them several years older than the center's average client; only three percent had not finished high school, and more than half had completed some sort of postsecondary training. Forty-five percent of the women had been pregnant at least once before being fitted with the cap. (Women in the study had used an average of three other contraceptive methods before the cap: 91

percent, the pill; 54 percent, the diaphragm; and 51 percent, the IUD.)

At the outset, 98 percent of the women were provided with the Prentif cavity-rim cap, and the other two percent were fitted with the Vimule cap. However, use of the Vimule cap was discontinued when the results of a California study showed that its design caused a buildup of cervical tissue and, in some cases, lacerations.

Trained personnel fitted all of the volunteers with the cap and provided detailed guidelines on its use: Women were instructed to keep the cap in place at least eight hours after intercourse, but no longer than three days; to fill the cap one-third to one-half full with a spermicide prior to each insertion; to use a backup method for the first month of intercourse; to have the cap refitted after a pregnancy; to wash the cap on removal, and to soak it in a diluted solution of vinegar, lemon juice or alcohol if odor became a problem.

Findings

Life-table analysis revealed failure rates of 17 percent after one year of use and 38 percent after two years. Of 62 women who became pregnant and provided data on consistency of cap use, 71 percent said they had used the cap at every act of sexual intercourse. Of 57 women who conceived and supplied data on dislodgement, 60 percent said the cap had not dislodged during intercourse. And of 48 women who became pregnant and who provided information about their use of spermicides, 88 percent said they had used them consistently. Method failure accounted for approximately one-quarter of the unplanned pregnancies that occurred among the 48 women who reported consistent use of both the cap and spermicides and who reported no dislodgement during intercourse.

The investigators found that women who became pregnant were more likely to have had problems with dislodgement than women who did not become pregnant (40 percent of pregnant women reported cap dislodgement compared with 32 percent of all the study participants).

Of the 438 women who returned to the center for a checkup, 33 were found to have developed abnormalities of the cervix, including erosion (five cases), signs of trauma (five), cervical tears (two), and ulceration of cervical tissue (one case, resulting from use of the Vimule cap). There were no reported instances of toxic shock.

The most common problem associated with cervical cap use was odor (33 percent), followed closely by dislodgement (32 percent). In addition, 22 percent of women said they had experienced discomfort, 19 percent had had difficulty inserting or removing the cap, 15 percent had had an unusual vaginal discharge, 13 percent said their partners had experienced discomfort from the cap, and 12 percent had suffered from intermenstrual bleeding.

Four out of 10 women who stopped using the cap did so because they decided to change to another method of contraception:

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Four percent chose sterilization, 20 percent began taking the pill, 6 percent had an IUD inserted, and 10 percent turned to other barrier methods.

Implications

Because most of the study participants reported adherence to the guidelines outlined by the clinic staff, the investigators conclude that the pregnancy rate of 17 percent after one year was due in large part to method failure, rather than user failure. Whereas the pregnancy rate of users would theoretically have been expected to diminish as women became used to the cervical cap or as they withdrew from the study, the proportion of women who became pregnant during each interval actually remained fairly constant. The investigators believe that this finding may be attributable to the deterioration of

cervical caps that were used consistently for more than six months. In fact, all caps that were used consistently for a year and those repeatedly left in place for longer than three days were found to have deteriorated to a greater degree than those used for shorter periods. The researchers believe that such deterioration may have affected the quality of fit and thereby increased the risk of pregnancy. For these reasons, the center staff now recommends that caps be left in place for no more than 24 hours at a time and that they be checked every six months, until such time as the materials used in their manufacture are improved.

Although the researchers found that most women expressed a high degree of satisfaction with the cap, they believe that close attention should be paid to users' complaints. Since dislodgement from the cervix is associated with a higher incidence of unplanned pregnancy, the investigators suggest that the Prentif cap be produced in a wider range of sizes than the four that are currently available. Better fit would improve the cap's efficacy and would allow more women to use it

without fear of dislodgement, they claim.

The recommendation for reducing odor by cleaning the cap in a solution of diluted vinegar, lemon juice or alcohol proved unsuccessful. These agents may, in fact, cause the rubber to deteriorate. The researchers now recommend use of a detergent high in phosphate and low in sulphate for cleaning purposes, but they nevertheless believe that the long-range solution to the odor problem lies in improving the materials used in the cap.

Since the majority of all study participants—both those who did and those who did not experience method failure—reported using spermicides consistently, the investigators question the necessity of using such substances at all in conjunction with the cap. They suggest further research to determine how much the cap's effectiveness is enhanced by spermicide use and how long the spermicide remains active.

Reference

I. M. G. Powell et al., "Contraception with the Cervical Cap: Effectiveness, Safety, Continuity of Use, and User Satisfaction," *Contraception*, 33:215, 1986.

Premarital Sexual Intercourse Far More Common Among Scottish Teens Today Than 20 Years Ago

Today's Scottish teenagers are much more likely to engage in premarital intercourse than were adolescents two or three decades ago, although they remain less likely to do so than are their English or Welsh counterparts. According to the results of a recent survey, only six percent of Scottish women born between 1926 and 1930 had premarital intercourse while they were teenagers, compared with 50 percent of those born between 1951 and 1955 and 61 percent of the 1961–1965 cohort. In addition, modern teenagers are less likely to marry than were their recent predecessors. Thus, the length of time during which a Scottish teenager is at risk of having a premarital conception has increased recently. Nevertheless, the probability that Scottish teenagers will become pregnant premaritally appears to have fallen, most likely as a result of high levels of contraceptive use among those who are sexually active.¹

The survey was conducted by the Office of Population Censuses and Surveys, on behalf of the Scottish Home and Health Department, in 1985. A total of 3,400 women aged 16–54 were selected randomly and interviewed concerning their experience of premarital sexual intercourse, conception and contraceptive use as teenagers.

Overall, in each year of the 1950s, about 2–3 percent of unmarried 15–19-year-olds

ever had intercourse; in 1964, this proportion was seven percent, and it climbed to over 20 percent in 1981. (Overall levels of premarital teenage sexual experience are lower in Scotland than in Great Britain as a whole: For example, in 1976, 37 percent of all unmarried British teenagers had had intercourse, compared with only 17 percent of single Scottish teenagers.)

An analysis using life tables to determine cohort levels of sexual experience indicates that 50 percent of women born between 1951 and 1955 had premarital intercourse during adolescence, as did 61 percent of women born in the period 1961–1965. However, the author of the survey report comments, despite claims that teenage sexual activity increased only after family planning services became available to single women (in 1968), and especially after such services were made available free of charge through the National Health Service (in 1975), "there were striking increases in teenage intercourse among single girls long before the development of the family planning services and even before the pill became available." For example, she points out that the proportion of young single women who ever had intercourse jumped from six percent of those born between 1926 and 1930 to 16 percent of those born between 1931 and 1935, and to 23 percent of those born in the period 1941–1945.

Until the mid-1950s, the increases in teenage sexual activity were accompanied by increases in the proportion of adolescents who were married. This proportion climbed from 16 percent of women born between 1926 and 1930 to about 29 percent of those born in the period 1941–1950 and 34 percent of those born in 1951–1955. However, among later cohorts, teenage marriage has become less common: Twenty-nine percent of women born in the period 1956–1960 and 22 percent of those born between 1961 and 1965 married as teenagers.

In addition, among women who ever had premarital intercourse as teenagers, anywhere from 33 to 41 percent of those born before 1951 married within nine months of first intercourse. In contrast, this proportion was only 28 percent among women born between 1951 and 1955, and just 19 percent among those born in the period 1956–1960. The author suggests that when single women became more likely to enter into sexual relationships, in the 1950s and 1960s, "it was often because couples anticipated marriage in the relatively near future. . . . In the later 1960s and [the] 1970s, however, the connection between premarital intercourse and the timing of marriage seems to have become more tenuous."

As a result of these trends, the time spent by teenagers at risk of a premarital concep-

tion increased substantially in recent years. The author estimates that the median length of time teenagers were at risk of premarital conception rose from around 15 months among women born before 1951 to 27 months for those born between 1956 and 1960. The probability of a teenager's having a premarital pregnancy also rose, from six percent among women born in the period 1926-1930 to 21 percent among those born in 1951-1955.

Thereafter, however, the proportion of teenagers conceiving before marriage began to decline, reaching a level of just 10 percent among women born between 1961 and 1965. Thus, the likelihood of premarital pregnancy in the teenage years was almost as low for women born between 1961 and 1965 as it was for those born between 1926 and 1930, even though the latter group was much less likely than the former to have sexual intercourse as adolescents. The investigator points out that the apparent decrease in recent years might have been due to an underreporting of abortions, although a similar trend in premarital conceptions has been observed for England and Wales.

The decline in premarital pregnancies in the face of increased sexual activity suggests, therefore, that younger Scottish women have adopted contraception in large numbers. Indeed, the data show that while only 18 percent of the women born between 1946 and 1950 used the pill while they were unmarried teenagers, fully 40 percent of those born in the period 1951-1955 did so. The proportion of women who had unprotected first intercourse while single rose steadily, from five percent of those born between 1926 and 1930 to 25 percent of those born in the period 1946-1950; however, among later cohorts, the proportion who had unprotected first intercourse remained virtually unchanged, despite the fact that overall rates of adolescent premarital intercourse increased from 36 percent to 61 percent.

At the time of the survey, only three percent of single teenage women who had had intercourse in the previous 12 months had not used some contraceptive method at last intercourse. Indeed, a rising proportion of young women reported that they had obtained a method of birth control prior to first intercourse. Among women born between 1941 and 1945, nine percent reported having been prepared before first intercourse, compared with 36 percent of women born in the period 1951-1955 and 41 percent of those born in 1956-1960.

Reference

1. M. Bone, "Trends in Single Women's Sexual Behavior in Scotland," *Population Trends*, No. 43, Spring 1986, p. 7.

Abortions as Currently Performed Do Not Appear To Increase the Risk of Subsequent Miscarriage

Women who have had one induced abortion are not at increased risk of subsequent miscarriage. However, there is an association between multiple abortions performed prior to 1973 and an increased risk of miscarriage. This increased risk is possibly attributable to adverse effects resulting from the methods generally used to terminate pregnancies before 1973, when abortion was legalized. Abortions induced by the procedures now most widely in use are not likely to increase a woman's risk of miscarriage in future pregnancies. These are some of the findings of a case-control study conducted in three New York City hospitals between April 1974 and November 1982.¹

The case group was drawn from among 6,339 women hospitalized for treatment of miscarriage in the public and private wings of the hospitals. Determination of the karyotype of the miscarried fetus was possible for 1,298 women, of whom nearly 30 percent were private patients and 70 percent, public. The control group, also divided into public and private patients, consisted of women who registered for prenatal care at the same three medical centers and gave birth at 28 weeks' gestation, or later. Data were collected on several factors thought to be associated with a history of induced abortion or miscarriage, including age, cigarette smoking, prior miscarriage, ethnicity, gravidity and parity.

The investigators examined the relationship between the karyotype of the miscarried fetus and the woman's history of induced abortion. They hypothesized that if induced abortions increased the risk of subsequent miscarriage, only pregnancies involving chromosomally normal fetuses would be affected because the mechanics of the procedure would not be likely to modify the genetic composition of the fetus and thus would not contribute to a woman's risk of carrying a chromosomally abnormal fetus. Odds ratios were computed to determine if women who miscarried were more likely to have had a history of induced abortion than were women who gave birth. The researchers sought to ascertain whether there was an association between multiple abortions and miscarriage; whether that association might vary with the woman's age and obstetric history at the time of her first abortion; and whether the gestational age of the fetus at termination, the abortion procedure used and the year in which it was carried out (pre- or post-1973) had a bearing on the association.

As the investigators had expected, neither single nor multiple induced abortions had any effect on a woman's likelihood of miscar-

rying an abnormal fetus, among either public or private patients. Further, the risk of miscarriage of a normal fetus was no greater for women who had had a single induced abortion than for those who had not. In the analysis of one versus no induced abortions, the odds ratios comparing cases with controls were close to one for both public and private patients (0.9 and 1.2, respectively). The lack of association between a single induced abortion and miscarriage of a normal fetus persisted even after the researchers controlled for the possible confounding variables.

When the investigators examined the relationship between multiple induced abortions and subsequent miscarriages of normal fetuses, they found some differences between private and public patients. Among public patients, a history of two or more abortions did not increase the risk of a subsequent miscarriage: The odds ratio remained close to one, regardless of the number of abortions performed, even when adjusted for such characteristics as the woman's age, ethnicity and year of recruitment into the study. Similarly, when the researchers adjusted for the timing of induced abortions, they found that the odds ratio stayed close to one when only the first of the multiple abortions occurred before 1973. However, when two or more of the abortions occurred before 1973, the odds ratio rose to 2.6.

Unlike public patients, private patients who miscarried a normal fetus were more than twice as likely as controls to have had two or more induced abortions. Such patients differed from controls in three other ways: They were more likely to have had their first induced abortion before 1973; somewhat more likely to have had that abortion done by methods other than suction curettage; and more likely to have been under the age of 20 when they had their first abortion. The fact that only a very small number of private patients reported multiple induced abortions made it difficult for the researchers to determine the relative importance of these three factors. Nevertheless, they believe that a first induced abortion obtained before 1973 is a more likely risk factor for subsequent miscarriage than is either the woman's age at first abortion or the method of induction used. Indeed, private cases were more than three times as likely as controls to have a history of multiple abortions in which the first occurred before 1973 (OR = 3.4).

The researchers conclude that their findings are consistent with the theory that some miscarriages of normal fetuses may have a

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mechanical origin. They note that the induction techniques used before the legalization of abortion may have been more likely to cause cervical trauma than were methods used later. Further, they suggest that the difference in their findings for public and private patients may be due to the possibility that private patients were more likely to have had their abortions performed in a private physician's office than in a clinic. Since new abortion techniques were first and most widely used in clinics, private patients may not have benefited from them as early as or to the same degree as public patients, according to the researchers. In any case, their findings provide no evidence to suggest that multiple abortions performed after the mid-1970s increase a woman's risk of subsequent miscarriage.

Reference

1. J. Kline et al., "Induced Abortion and the Chromosomal Characteristics of Subsequent Miscarriages (Spontaneous Abortions)," *American Journal of Epidemiology*, 123:1066, 1986.

Wide State and Regional Variations in Both Cost And Rate of C-Sections

American women pay over \$4,000, on average, for a cesarean delivery, but there is a considerable amount of regional and state variation in this figure, as well as in the proportion of deliveries performed by cesarean section and in the length of hospitalization for the procedure. These differences are the subject of a study on the cost of cesarean deliveries conducted by the Metropolitan Life Insurance Company.¹

The study examined insurance claims for 8,636 women aged 15-44 whose cesarean deliveries were covered by Metropolitan Life's group health contracts between January 1982 and June 1983. The average cost (including medical and surgical expenses and hospital charges) was analyzed by state and region. The analysis was restricted to 34 states in which 50 or more cesarean sections were performed; these data represent 95 percent of the cases reported to Metropolitan Life.

Findings

The investigator reports that 43 percent of all cesarean deliveries in the United States in 1982-1983 were performed in the South, compared with 22 percent in the Midwest,

18 percent in the Northeast and 17 percent in the West. Further, she cites references showing that the proportion of births delivered by cesarean section was higher in cities than in rural areas, even after controlling for the mother's age and the baby's birth weight. The researcher uncovers no evidence, however, to support the theory that differences in cesarean birthrates might have been due to variations in the geographic distribution of high-risk populations.

There were also variations in the total cost of the operation (hospital charges plus physician fees). The national average cost was \$4,130 in 1982-1983, with charges in the four main regions ranging from a high of \$4,550 in the West to a low of \$3,780 in the South. Furthermore, three subregions reported charges in excess of the national average: These were the Pacific region (\$4,990), the Middle Atlantic region (\$4,690), and the East North Central region (\$4,430). Two-thirds of the geographic areas reported costs below the national norm—an indication of the extent to which charges in the highest-cost regions skewed the average.

Among the states, total charges for a cesarean birth differed by as much as 82 percent. The District of Columbia reported the highest total charge (\$5,350), followed closely by California, Illinois and New York. The lowest charge was reported in Utah (\$2,940).

Physician and hospital charges (including room and board and ancillary fees) also varied by region and state. On average, hospital charges represented close to 70 percent of the total insurance bill for a cesarean birth; the proportion ranged from 77 percent in Michigan and Missouri to 64 percent in Maryland and California. The average physician fee was \$1,270 nationally; the highest fees were charged in California (\$1,890) and New York (\$1,780). By contrast, Iowa physicians charged only \$910, 28 percent below the national average.

The average length of hospital stay for a cesarean section was 6.0 days. However, women in New York had a much longer stay (8.7 days), which was 45 percent above the national mean. The researcher found that the length of hospital stay was not necessarily related to the costs, however. For example, in California, where total and component charges were among the highest in the country, the length of stay was only 5.1 days, or 15 percent below the national average.

The author of a commentary accompanying the study² points out that the rate of cesarean deliveries increased to 21.1 per 100 deliveries in 1984 and is increasing in all regions of the United States, among women of all age-groups, marital statuses and racial groups, and in all types and sizes of hospitals.

Unpublished tabulations from the National Hospital Discharge Survey released by the National Center for Health Statistics reveal that the cesarean rate rose again in 1985, to 22.7 per 100 deliveries. In addition, the rate of cesarean births is higher among women covered by private health insurance than among women who are cared for under government programs or who lack insurance. The author points out that obstetricians frequently mention the fear of malpractice lawsuits over negative birth outcomes and the practice of defensive medicine as being partly responsible for the rising rate of cesarean deliveries. The commentator joins the investigator in calling for increased education of consumers and providers about the medical feasibility of vaginal birth after a cesarean delivery. Ending the routine practice of performing repeat cesareans, the commentator believes, could lead to a reduction in cesarean birthrates and, consequently, to lower costs.

References

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2. P. Placek, "Commentary: Cesarean Rate Still Rising," *Statistical Bulletin*, Vol. 67, No. 3, 1986, p. 9.

Well-Trained Physician Assistants Can Perform Early Abortions Safely

Well-trained physician assistants are found to perform first-trimester abortions as safely as physicians, when outcomes are measured in terms of complication rates. A two-year prospective study conducted at the Vermont Women's Health Center revealed no significant differences in overall, immediate or delayed complication rates between women whose first-trimester abortions were performed by physician assistants and those whose abortions were performed by physicians.¹ Although a number of studies have shown that physicians can provide first-trimester abortions safely in an outpatient setting, this study represents the first evaluation of the performance of physician assistants relative to the results achieved by medical practitioners.

The study sample consisted of all women who obtained a first-trimester abortion at the Vermont Women's Health Center between January 1, 1981, and December 31, 1982. During that period, a total of 2,458 pregnancy terminations were included in the study: 1,285 were performed by physician assistants and 1,173, by physicians. There was no differential allocation of patients to

physicians or to physician assistants: Patients were seen by whichever provider was available in the clinic. In general, the study group was representative of the population of women seeking abortions in Vermont. The majority were white (98 percent), single (77 percent) and under 25 years of age (71 percent). Fifty-four percent were pregnant for the first time, and 68 percent had had no previous abortions.

The clinic used only two abortion methods, both under local anesthesia: early uterine evacuation and suction curettage. Clinic protocol required that early uterine evacuation be performed no later than eight weeks following the patient's last menstrual period, provided this criterion was consistent with uterine size as determined by pelvic examination.

Patient participation in the study was voluntary. At discharge from the center, women were instructed to return to the clinic for a checkup or to see their own doctor within four weeks. Those who elected to see their personal physician were given a questionnaire dealing with possible delayed complications, to be filled out by the private physician and returned to the clinic for analysis. Immediate complications were defined as those evident before discharge; delayed, as those noted any time within the four-week postabortion period.

The overall complication rate associated with abortions performed by physician assistants was 27 per 1,000 procedures, compared with a rate of 31 per 1,000 following those carried out by doctors. The immediate complication rates were five per 1,000 procedures performed by physician assistants and eight per 1,000 in the comparison group. Delayed complication rates were 23 and 24 per 1,000 abortions for physician assistants and for physicians, respectively. The researchers attribute the fact that the delayed complication rate was over twice that reported in a previous study to the aggressive follow-up that was carried out in the Women's Health Center study.

Type of abortion procedure was the only variable that significantly affected the total complication rate. The authors found a higher total complication rate associated with abortions performed by early uterine evacuation (39 per 1,000 procedures) than with those carried out by suction curettage (23 per 1,000). They further discovered that the total complication rate among women who had an early uterine evacuation at 7-8 weeks' gestation (49 per 1,000) was substantially higher than the rate among those whose abortions were performed at less than seven weeks' gestation (five per 1,000). (In response to this finding, according to the investigators, the

center altered its protocols for uterine evacuation procedures.) Early uterine evacuation was associated with an increased number of delayed complications such as uterine hemorrhage and retained products of conception, and this relationship was independent of practitioner category.

Physician assistants have been providing pregnancy terminations in Vermont since 1975. They perform more than 20 percent of the 3,500 abortions that are done yearly in the state. The absence of differential complication rates following abortions performed by physicians and those performed by physician assistants could have significant implications for the future involvement of physician assistants in the provision of abortions, according to the authors. However, they caution that because of the clinic's rigorous apprenticeship system for trainee assistants and the unique homogeneity of the population served at the Vermont Women's Health Center, it may be inappropriate to generalize their conclusions to other abortion programs.

Reference

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Few Private MDs Ask Teenage Patients About Their Sexual Activity

Few private doctors giving routine physical examinations to adolescents ask their patients—especially their male patients—whether they are sexually active. As a result, one potentially important aspect of adolescent health care is probably neglected by many doctors. This is the major conclusion of a study designed to assess whether private physicians caring for healthy young people are observing the guidelines on reproductive care issued by the American Academy of Pediatrics.¹

The investigator, a Massachusetts pediatrician, interviewed 244 young people coming to her office for a routine health check-up. In addition to demographic and health data, she obtained information about the adolescents' sexual activity and previous health check-ups. The teenagers were predominantly white (86 percent) and female (81 percent), ranging in age from 13 to 18.

Although 75 percent of those sampled said they had received a complete physical examination within the two years preceding the interview, only 23 percent of those who were currently sexually active had had a physical since initiating such activity. Among the 13-

14-year-olds, 12 percent of the girls and 20 percent of the boys said they had had sexual intercourse. Among the 15-17-year-olds, these proportions rose to 33 percent for the girls and 35 percent for the boys.

Only 22 percent of the girls and four percent of the boys said their doctors had ever asked them about their sexual activity. Among the teenagers who were sexually active at the time of the interview, 62 percent said they had never been asked about their sexual activity. Of the girls who were sexually active, only one in four had seen a doctor since becoming sexually active; most girls had seen a gynecologist.

According to the investigator, the American Academy of Pediatrics recommends that from the age of 12, healthy adolescents should see a doctor every two years for a routine check-up, and that at those visits, doctors should ask their patients if they are sexually active. The researcher concludes that these guidelines are not being followed. She hypothesizes that sexual activity among boys is not seen by doctors as involving any health risk, which may explain why boys are questioned so much less frequently than girls are on this matter. Alternatively, she suggests, doctors may be embarrassed or not well trained to respond to male sexual activity. In addition, physicians may believe that their own patients are not sexually active, may not want to get involved, may not know what to do with the information, or may fear antagonizing the teenager and the teenager's parents. She claims that in order to make an adequate assessment of sexual activity among their adolescent patients, doctors might have to alter their style of practice by keeping parents out of the examination room and by "informing teenagers of their right to confidentiality."

In a final recommendation, the investigator suggests that a complete physical examination for healthy adolescents could be scheduled every two years, and the alternate year, a discussion visit could be arranged. This would provide doctors with an opportunity to delve more deeply into potential problem areas for teenagers.

Reference

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Credits

Cover design and illustration by Mark Kelllogg.

Comment

Population Decline: A Threat to the West?

By C. Alison McIntosh and Barbara B. Crane

A new specter is haunting the land—depopulation. Some conservative policy analysts fear that if fertility rates in the United States and Europe remain as low as they currently are, the security of the West may be jeopardized and its cultural influence undermined. In recent months, this message has been widely communicated in the popular press, in large part thanks to a symposium held in December 1985 by the American Enterprise Institute for Public Policy Research (AEI). Ben J. Wattenberg and Karl Zinsmeister of AEI prepared a discussion paper for the symposium,¹ in an article based on that paper, they wrote that “the geopolitical security and potency of America and its Western allies are likely to be threatened by a variety of population trends now under way around the world. . . . Today, every major nation that is both modern and free is also on a fertility track that, unless changed, will lead to a substantial loss in population.”² At the meeting, a group of experts ranging from Defense Department and State Department analysts to university scholars* responded to the findings of the Wattenberg-Zinsmeister analysis and to another paper by economist Allen

Kelley.³ In this article, we comment on some of the issues raised in those papers and in the discussion that followed.⁴

Current fears of depopulation in the West evoke a strong sense of *déjà vu*. “Strategic demography,” a term used in a new book to denote ideologically inspired demographic analysis,⁵ was an important component of mercantilist thinking as the emerging nation-states of Western Europe jockeyed for political and military advantage in the 16th and 17th centuries. An even closer parallel may be drawn with the fears of European nations during the tense period between the closing years of the 19th century and the end of the Second World War.

At that time, no European state was entirely free of anxiety over the possibility of falling behind in the population race. In France, however, such fears reached the level of a national paranoia. The French defeat at the hands of Prussia in 1870 triggered panic-stricken comparisons with the glorious days under Napoleon, when France was the most populous nation in Europe. (Russia actually had a larger population, but in the early 19th century was too underdeveloped to be compared with France.) *Dénatalité* came to be regarded as a symptom of national degeneration, to which was attributed all of France’s misfortunes, actual or anticipated.⁶ But, according to the authors of a recent study of such concerns, “in all these counsels of gloom, we can observe . . . the tendency to presume, rather than to prove, the causal link between demographic and military or political change.” It is understandable, the authors observe, that before warfare was fully mechanized, military strength should be equated with superiority of numbers, but it is less defensible now to reduce “major and complex questions of international politics to . . . mere reflections of vital statistics.”⁷ Precisely this sort of reductionism characterizes many of today’s arguments.

The consequences of zero or negative growth are not well understood, and it is

entirely appropriate that they should be examined further. The prospects for continued economic growth, as well as the social and political problems arising from the increasing number and proportion of elderly people in Western societies, have already claimed increasing scholarly attention.⁸ By comparison, the geopolitical and strategic implications of declining population growth have been neglected. To the extent that the current discussion in the United States attempts to fill this gap, it is welcome. Nevertheless, we believe that the arguments currently circulating are alarmist and rest on poorly justified assumptions.

Strategic Demography

In their paper for the AEI, Wattenberg and Zinsmeister base their concerns on comparative population projections made for three world regions: the West (including North America, Western Europe, Australia, New Zealand and Japan), the Soviet bloc (the Union of Soviet Socialist Republics and Eastern Europe) and the less-developed countries. They observe that if current birthrates continue, the population of the Western community will grow another 8–9 percent, but after 2020, the population will begin to shrink, possibly reaching two-thirds of its present size by 2150.⁹ In the process, the substantial population advantage currently enjoyed by the West over the Soviet bloc will be eroded. Meanwhile, the nations of the developing world will continue to grow rapidly.

Wattenberg and Zinsmeister tend to present these projections as forecasts, the implications of which they assume to be almost inevitable. Demographers, who have been proved wrong more often than is comfortable, are much more cautious in their use of projections, recognizing that these are no more than the mechanical working out of a set of assumptions. Even if the projected trends prove to be correct, the pace of change will be far slower than the reader is

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led to believe. The projections themselves indicate that it will be almost 150 years before the population of the Soviet bloc comes to equal and then surpass that of the West (see Figure 1)—plenty of time, one might think, for major changes to take place both in the components of population growth and in international relations. Furthermore, the West is already vastly outnumbered by the populations of Third World countries, and there is little that can be done to change the numerical balance. Although the importance of differences in population size cannot be entirely discounted, changes in Western fertility and population growth rates are unlikely to play a significant role in the West's relations with this heterogeneous group of nations.

There also is misunderstanding about the implications of changes in fertility rates for population size and growth. Replacement-level fertility (an average of 2.11 children per woman, given today's low mortality) is sometimes interpreted as an absolute line of demarcation between population growth and decline; very small fluctuations in either direction are seen as cause for relief or alarm. Instead, since real populations seldom display perfect stability in their demographic rates, but rather tend to fluctuate up and down from year to year, it is more realistic to think of a small range of fertility rates on either side of 2.1 as generally denoting zero population growth.

It is worth noting, therefore, that while some European nations on both sides of the East-West border have total fertility rates (TFRs) of around 1.3 or 1.4, which might justifiably cause some concern, TFRs in many of the other major industrialized nations, including the United States, have remained relatively constant at around 1.8 or 1.9 for almost a decade. Rates such as these imply a very slow decline that leaves plenty of time for adaptation or change. Further, Australia, Canada, New Zealand and the United States still have several decades of population growth ahead of them because of the demographic momentum inherent in the age-structure of their populations—a result of the extended postwar baby boom in these countries.

In addition, TFRs seldom reflect accurately the completed fertility of any group of real women. The calculation of true completed fertility (cohort rates) requires that demographers wait until the women born in a specific year have passed through their reproductive span (in developed countries, from about age 15 to age 44). Instead, the most commonly calculated TFR, known as a period rate, represents the fertility of a synthetic cohort of women; this rate is constructed by

combining the fertility of women in all age-groups from 15 to 44, in a given calendar year. In times like the present, when patterns of childbearing are in a state of flux, period rates often give a false picture of the underlying fertility of real women. As happened in the 1930s, projections based on such rates may turn out to be very misleading.

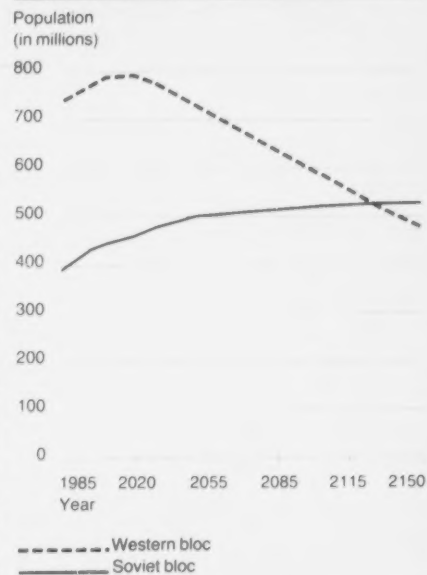
Finally, the very long-term projections used by Wattenberg and Zinsmeister are fundamentally meaningless, because the range of uncertainty with regard to fertility rates over the next 100 years is very large. On examining changes in the patterns of family formation, some theorists can see nothing that might signal a return of higher fertility in the near future;¹⁰ others envisage an upturn within the next decade.¹¹ Similarly, we cannot foretell the future of mortality rates, although these are now so low in developed countries that future changes are unlikely to have much effect on population growth. Moreover, United Nations estimates suggest that the Soviet Union's crude death rate, which is somewhat higher than that of most Western countries, may be leveling off.¹² To the extent, therefore, that mortality levels may influence population growth, they would appear to confer at least a minor advantage on the West.

Population and International Power

Concerns about declining Western influence depend in large measure on assumptions about how population size and growth affect political and military power. In times past, conventional armies were an important element of national power, and the number of foot soldiers that could be recruited was closely associated with population size. In today's more complex world, population size is still considered an element of power, but certainly no linear relationship exists between population growth rates and increasing or decreasing national power. Many additional variables have to be factored into the security equation. Today, levels of economic development, availability of natural resources, the education and morale of the people, the stability and legitimacy of government, the quality and moral reputation of leadership, and the capacity to form and maintain alliances are all thought to be important components of national power.¹³ Some have argued that population size will again become critical once levels of development in the Third World more nearly approach those of the currently industrialized countries;¹⁴ however, this prospect now seems much farther off than it was when the argument was first made.

Moreover, assessments of power cannot

Figure 1. Projected population of countries in the Western bloc* and in the Soviet bloc,† 1985–2150



*The Western bloc consists of North America, Western Europe, Australia, New Zealand and Japan.

†The Soviet bloc consists of Eastern Europe and the Soviet Union.

Source: See reference 2, p. 24.

be separated from the objectives of nations, the arenas of action and the issues at hand. The relative population size of nations and other population-related measures of power, such as gross national product and size of conventional military forces, had little to do with the outcome of the conflict in Vietnam or, more recently, with struggles for control over the energy markets of the world, with efforts to limit nuclear arms and to curb terrorism, or with negotiations to bring peace to Central America.

Much of the discussion of population size, power and international security still focuses on the question of maintaining adequate levels of conventional armed forces. Recruiting military manpower is a troublesome problem for Western nations, but levels of recruitment for the alliance as a whole are likely to be significantly affected by demographic trends only in the relatively distant future. Even with declining populations, the Western nations should be able to maintain force levels if they create new incentives for military service. The pool of potential recruits can be enlarged through changes in age and sex requirements, and organizational and technological improvement can compensate for fewer numbers. In any case, a large-scale, extended conflict involving conventional forces is only one among many possible war-

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fare scenarios. The arguments for trying to increase fertility today to serve the hypothetical defense needs of tomorrow are not compelling.

Wattenberg and Zinsmeister argue that fertility decline will sap the economic vigor of the West—and, thus, ultimately, its power. They comment that "the mechanics of low fertility are such that the West may be headed for a difficult time economically in the intermediate to long-range future. [Western] Europe, North America, Japan and Australasia will likely be aging, with fewer and fewer young workers and fresh ideas fueling the bottom of the social pyramid. Many important economic markets will be disrupted at least temporarily. . . . Society will move from growth, to stasis, and then to absolute decline."¹⁵

Their analysis seems to be at odds, however, with the views of another segment of conservative opinion influential within the Reagan administration. Those are the views that were officially expressed by the U.S. delegation (of which Wattenberg was a member) to the International Conference on Population at Mexico City in 1984. The delegation held that population growth is a "neutral phenomenon" in its relationship to development. Accordingly, governments should not seek to influence fertility behavior for eco-

nomic reasons; rather, what is needed to bring about economic development in the Third World are market-oriented economic policies. But if one is to adhere to that doctrine, as Wattenberg and Zinsmeister do, one cannot logically reject its application to the industrialized countries. Indeed, the laissez-faire course would seem to be much more appropriate for the latter, where population change is occurring more slowly and where the capacity for economic and technological adaptation is much greater. Western European countries, for which population stabilization has been a fact of life for the past decade, seem to have chosen primarily to adjust to the demographic situation, as there is only a weak constituency for pronatalist policies.¹⁶ Most European analysts now appear to believe that carefully chosen economic policies, plus the development of new markets overseas and continued technological progress, will maintain economic growth.

Whose Values?

Concern is also being expressed over the ability of the West to continue promoting its values overseas if its population starts to decrease. This worry seems to derive from a Manichaeist worldview that asserts, in effect, that Western values, especially those that

emphasize the supremacy of individual rights, are an unalloyed good that must prevail everywhere. Such a viewpoint leaves little room for other values that might be preferred by other societies and cultures, and assumes that the benefits brought to the Third World by the West—science, technology, medicine, access to global markets, concepts of law—have been without cost to the recipients. Furthermore, this view implies that the continued hegemony of particular (i.e., Western) nations is essential for progress. However, whether Western values prevail in the centuries ahead—the time frame we are discussing—will depend more on their intrinsic merit than on proselytizing foreign policies, sophisticated weapons systems or higher fertility.

At the core of American conservatives' anxiety over declining population size is the fear that depopulation will increase the probability of eventual Soviet dominance and the spread of communism around the world. But isn't this an exaggerated alarm? Recent trends in Soviet influence give greater cause for optimism than for pessimism. It is Western, not Soviet, goods that are coveted by citizens of developing countries, and it is to the West that thousands of would-be immigrants clamor for admission. On the societal level, many of the world's peoples have

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shown determination to preserve their autonomy and to adopt only those aspects of foreign culture and practices—capitalist or socialist—that they deem compatible with their own. The evidence that many of them are about to swallow the Soviet hook is weak.

The broader issue here concerns the prospects for the extension of democracy in a world in which the population of Western nations is decreasing relative to that of the rest of the world. However, posing the issue in this way is simplistic and misleading. For one thing, democracy is not to be equated with geographic location. We should recall that while democracy has historical roots in Western Europe, within recent memory it was temporarily eclipsed in several European countries. Since the Second World War, moreover, a number of countries, including Argentina, Brazil, Ghana, Nigeria and Turkey, have moved back and forth between democratic and nondemocratic forms of government.¹⁷

Additionally, if Japan may be regarded as part of the West, why not other countries? There are grounds for hope in the recent signs of returning democratic freedoms in Argentina, Brazil, other parts of Latin America and possibly the Philippines. Moreover, while few would contest the proposition that a strong United States is a force for democracy in the world, many analysts could also point to instances in which the United States has used its power to maintain nondemocratic regimes. In any case, the underlying social structure and levels of economic development of a nation may be more important determinants of democracy than international influence.¹⁸ Finally, even if one believes that the Western alliance is directly or indirectly influential in shaping foreign political systems, this influence is unlikely to be eroded by any population decline that can realistically be expected in the foreseeable future.

What Should Be Done?

We can identify three broad types of policy responses to declining fertility: adjustments in economic and social policies, as well as in defense planning; controlled immigration; and pronatalist measures.

The first course, that of policy adjustment, is already being implemented in many sectors, although it is not always recognized as relating to fertility decline because most public policies involve multiple considerations, of which demographic concerns are only one. Efforts to reform the social security system, which is being seriously affected by changes in age-structure brought about by declining fertility, are but one example of the policy of accommodation. However, continuation along such an incremental path is

clearly not the goal of activists who try to stir up fears about the current low levels of childbearing.

The second course—increasing population size through immigration—seems quite feasible. Studies have shown that remarkably small changes in the current level of immigration would keep the nation growing through the next century under any realistic assumptions about fertility and mortality.¹⁹ Controlled immigration could, therefore, ensure the vitality of the nation and meet many of the concerns raised by Wattenberg and Zinsmeister and others. In this respect, the situation of the United States differs from that of most Western European countries, where high levels of unemployment, coupled with high population densities, make immigration a less attractive proposition, at least for the time being. Wattenberg and Zinsmeister acknowledge a role for immigration in the United States, but they downplay its significance on the ground that it is not politically feasible. Although it is true that immigration may not be popular among many of those who are most receptive to Wattenberg's and Zinsmeister's arguments, immigration is both within the American tradition and an appropriate response to any deficiency in natural increase.

The third course is to seek to promote higher fertility. For example, the possibility of introducing European-style family-policy measures to the United States in order to lessen the burden of parenthood on working couples has been increasingly discussed.²⁰ Such measures might include instituting an extended period of paid maternity leave; permitting time spent caring for young children to count toward the calculation of social security or pensions; providing free or subsidized day-care facilities; and providing greater tax relief and old-fashioned cash allowances for families with children. Indeed, within the past decade, there has been a considerable expansion of family benefits through the private sector in the United States, although so far few of them have become enshrined in public policy.²¹

Nevertheless, welcome as these measures might be as a means of improving the quality of children's lives, there is little evidence that policy changes can bring about more than a small and temporary increase in the number of births. In East Germany, Hungary and Romania, where fertility had fallen below replacement level by the 1960s, pronatalist policies did manage to raise birthrates for a time. By 1984, however, fertility had once again fallen below replacement level in these countries. (Even the highly repressive aspects of measures introduced in Romania in 1967—the suppression of abor-

tion combined with continued prohibitions on contraceptives—were effective only until women remembered that traditional methods of contraception are a great deal better than nothing.²²)

Wattenberg and Zinsmeister clearly recognize the difficulties and limitations of specific incentives and new institutional arrangements, perhaps not least because they potentially involve greater government intervention in society. They conclude that "it is in the realm of the spirit that the most important changes must come."²³ Certainly, a return to a more family-oriented way of life would seem to be an essential precondition for the return of higher fertility. Since we know little of the psychological correlates of childbearing, however, society is not yet in a position to design educational programs or other measures that are likely to encourage couples to have larger families. We are inclined, moreover, to question the value of appeals based on cultural nationalism and fears of other people's numbers. Might it not be more desirable for us to try to engender a greater faith in the long-term prospects for democracy around the world, a spirit of openness to newcomers, and a determination to seek and promote what is best in all cultures, not just in Western societies? This would be a more positive message to send to young couples who are engaged in planning their families.

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Research Note

Sterilization Regret Among U.S. Couples

By Stanley K. Henshaw and Susheela Singh

Sterilization is the most popular contraceptive method in the United States. As of 1982, about 9.4 million U.S. couples had elected to protect themselves from pregnancy by sterilization of one or both partners.¹ The procedure has obvious advantages: It is almost 100 percent effective, it requires no thought or effort after the initial operation, and it is relatively inexpensive when the cost is amortized over the years of contraceptive benefit. The method, however, has one major disadvantage: If a sterilized individual wants the procedure reversed, the operation is costly, difficult and frequently unsuccessful.

Research on the extent to which sterilized individuals regret their decision is important, therefore, for several reasons. First, we need to know whether the extent of regret is so great as to make voluntary sterilization inadvisable in general or for certain population groups. Second, more understanding of the factors that contribute to a desire for sterilization reversal might help counselors identify individuals at high risk of regret, so that they can be given special attention. Third, quantifying the need for sterilization

reversal would be useful in planning services to meet that need.

The 1982 National Survey of Family Growth (NSFG) attempted to measure sterilization regret. This survey of 7,969 U.S. women aged 15-44 included three questions on the subject. First, women in couples protected by sterilization were asked whether they would like to "have a(nother) baby."^{*} If the answer was yes, they were asked whether they (and their husbands if they were married) would like to have the sterilization reversed if it could be done safely.[†]

In this research note, we will present an analysis of the answers to these questions. However, a meaningful interpretation of the data is extremely difficult. Many women may be speaking of an ideal scenario when they say that they would like to have more children; for practical reasons, they might choose not to do so. In addition, the survey asked only women about the desire for more children; it did not explore the attitude of the male partner. Even those who say that they would like to have the operation reversed may not be highly motivated to undergo the procedure. They were not asked to consider the cost, inconvenience, risk to health and failure rate. For these reasons, answers to the questions are not a good indication of the

strength of regret, and they provide an inconclusive measure of need or potential demand for this type of infertility service.

Although the proportions who would actually have a reversal are likely to be overstated in this analysis, the data are worth examining as a first step in quantifying the extent of sterilization regret and understanding the desire for reversal. The logical next step, a multivariate analysis, was beyond the means of the larger study from which this analysis originates.² More detailed studies of the NSFG and of other data sets containing information about sterilization, as well as the collection of new data, are needed.

Couples Expressing Regret

Table 1 summarizes data for 8.6 million couples who chose sterilization for contraceptive reasons and who had either a vasectomy or tubal ligation—procedures that are poten-

*The question was, "If it were possible for you to have a(nother) baby, would you, yourself, like to have one?"

†The questions were, "As things look to you just now, if the operation could be safely reversed, that is, changed back, would you want to have it reversed?" and "Would your husband like to have it reversed?" The permissible answers were "definitely yes," "maybe yes" and "definitely not."

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Table 1. Number and percentage distribution of U.S. couples protected by vasectomy or tubal ligation; percentage who want more children; number and percentage who want a sterilization reversal; and percentage distribution of those who want a reversal, by selected characteristics; 1982 (numbers in 000s)

Characteristic	Total		% who want more children	Want reversal		
	No.	% dist.		No.	% of total	% dist.
Total	8,583	100	26	882	10	100
Age-group†						
20-24	388	5	42*	42‡	11*.‡	5‡
25-29	1,221	14	41	269	22	30
30-34	2,351	27	32	285	12	32
35-39	2,441	29	21	163‡	7‡	18‡
40-44	2,183	25	13	123‡	6‡	14‡
Race						
Black	916	11‡	28	160	17*	18‡
Other	7,667	89	25	722	9	82
Ethnicity						
Hispanic	511	6‡	49*	151‡	30*.‡	17‡
Other	8,072	94	24	731	9	83
Poverty status, by age						
<30, <150%	543	0‡	41	121‡	22‡	14‡
<30, ≥150%	1,066	13‡	41	190‡	18	22‡
≥30, <150%	1,214	14	25	184	15‡	21‡
≥30, ≥150%	5,760	67	22	387	7	44
Medicaid recipient						
Yes	466	5	40	132‡	28*.‡	15‡
No	8,117	95	25	750	9	85
Years of education						
<12	1,461	17	30	207‡	14	24‡
12	4,063	47	28	420	10	48
>12	3,059	36	20	255‡	8	29‡
Person sterilized						
Woman	5,535	64	26	619	11	70
Man	2,979	35	25	247	8	28
Both	69‡	1‡	24‡	16‡	23‡	2‡
Currently married						
Yes	7,177	84	25	587	8*	67
No	1,406	16	31	295	21	33
Parity						
0	318	4‡	39‡	71‡	22‡	8‡
1	720	8‡	33	101‡	14	11‡
2-5	7,334	86	24	677	9	78
>5	210	2‡	21‡	33‡	16‡	4‡
Last birth‡, **						
Planned	4,384	53	25*	368	8	45
Mistimed	2,311	28	31	283	12	35
Not wanted	1,555	19	17	160‡	10	20‡
Age at sterilization						
<30	4,457	52	33*	629	14*	71
≥30	4,125	48	17	253	6	29
Years since sterilization						
<5	4,105	48	31*	520	13*	59
≥5	4,478	52	21	362	8	41
Teenage parent, by age**						
<30, teenage birth	844	10‡	42	176‡	21	22‡
<30, no teenage birth	675	8‡	40	100‡	15	12‡
≥30, teenage birth	2,012	24	19	191‡	9	24‡
≥30, no teenage birth	4,734	58	23	344	7	42

*Difference between at least one pair of demographic subgroups is statistically significant ($p \leq 0.05$).

†The survey included women 15-19, but the number contraceptively sterilized was too small for analysis.

‡Relative standard error is 30 percent or greater. §Data for 15 couples are missing.

**Excludes 318 who had no children, 71 of whom wanted reversal.

tially reversible. (Another 860,000 women say they have had a hysterectomy for contraceptive reasons.) Twenty-six percent of the female partners of these couples with potentially reversible sterilizations—some 2.2 million women—say they would like to have a child or additional children. Thirty-nine percent of these women—about 10 percent of the total—report that both they and, if married, their partners want to have the sterilization reversed.*

The proportion of women dependent on contraceptive sterilization who say they want more children is highest among those aged 20-29 (slightly more than 40 percent), then declines with rising age to a low of 13 percent among women 40-44. Some of the older women, of course, may have wanted more children when they were younger, but changed their minds with advancing years.

Those aged 25-29 are the most likely to want another child and want a reversal of their sterilization (22 percent do so). A lower proportion (11 percent) at ages 20-24 may reflect a lack of time for regret to have developed; the interval since sterilization for these women probably averages no more than a year or two. (The number dependent on sterilization in this age-group is also very small, making the percentage statistically unreliable.) Of all women who say they want a reversal, 62 percent are aged 25-34.

Black women who depend on sterilization are not significantly more likely than their nonblack counterparts to report that they want more children. But for women who do want more, a significantly higher proportion of blacks than of others say they would like a reversal. Blacks make up 11 percent of contraceptively sterilized couples but 18 percent of those who want the procedure reversed.

Forty-nine percent of Hispanic women who are protected by contraceptive sterilization report that they would like more children, and 61 percent of these women state that they want a reversal. As a result, a higher proportion of Hispanic women than of any other population group say they want a reversal—30 percent, compared with just nine percent of non-Hispanic women. Hispanics represent just six percent of contraceptively sterilized couples but 17 percent of those who express a desire for reversal. This striking and significant difference between Hispanic and non-Hispanic women is difficult to

*Unmarried women were asked only whether they themselves wanted a reversal. A married couple was recorded as desiring a reversal if the woman reported that the sterilized partner "definitely" wanted a reversal and the nonsterilized partner "definitely" or "maybe" wanted his or her partner to have a reversal.

explain, and may indicate cultural bias in the responses to these questions. Since poverty and low educational attainment are highly correlated with black race and Hispanic origin, some of the racial and ethnic differences may also reflect differences in socioeconomic status.

Poor women (those with incomes below 150 percent of the federal poverty index*) are significantly more likely than women of greater means to report that they would like to have their sterilization reversed—17 vs. eight percent (not shown). This finding, however, appears to be largely because those women are concentrated in the younger age-groups. When women in each economic category are compared by age-group (younger than 30 and 30 years and older), poor women still have somewhat higher proportions wanting a reversal, but the difference is no longer statistically significant. Significantly higher proportions of Medicaid recipients than non-Medicaid recipients want a reversal, but this may also be because Medicaid women are generally younger than others.

Differences by education are not significant, although the pattern reveals a declining proportion who want more children or want a reversal of their sterilization as education rises. Metropolitan status and geographic region also have no statistically significant effects (not shown). Neither is there a difference in the proportion expressing regret by whether the woman or her partner was sterilized; however, it must be remembered that only women were interviewed.

Women who are not currently married are significantly more likely than married women to express a desire for reversal (21 vs. eight percent), possibly a reflection of changes in the life circumstances of those who are separated, divorced or widowed. Although only 16 percent of sterilized women are unmarried, 33 percent of those desiring a reversal fall into this category.

The number of children a woman has had shows little association with sterilization regret. Those with no children appear to express more regret, but the numbers are small and not statistically significant. Women whose last child was wanted (either planned at that time or wanted later but mistimed) are significantly more likely to say they want another child than women whose last birth was unwanted. However, whether or not the last birth was wanted makes no significant differ-

ence in the desire to have a reversal.

Women who were sterilized before age 30 are significantly more likely than those who were aged 30 or older when they were sterilized to want another child (33 vs. 17 percent) and to desire a reversal (14 vs. six percent). Women who had a tubal ligation less than five years ago are significantly more likely to say they want another child than those who had the surgery more than five years ago (31 vs. 21 percent). The desire for a reversal is also associated with the number of years since the operation, but the difference is not statistically significant.

The significant relationships noted between the desire for more children or the desire for reversal and age at sterilization or number of years since sterilization are difficult to interpret; they are also associated with current age, which is highly correlated with desire for more children and for reversal. Therefore, differentials in the level of sterilization regret might change in a multivariate analysis, where each factor is analyzed while the others are controlled for.

If we hypothesize that women who started childbearing early, perhaps because they were not successful in using reversible methods, are more likely than women who started childbearing later to resort to sterilization at an early age, then we might also assume that the former would be more likely to regret their sterilization decision. However, the data show that women who had a birth while teenagers—represented in about 35 percent of all sterilized couples—are no more likely than those who did not have a teenage birth to want another child. Although they are more likely to say they want a reversal—13 vs. eight percent (not shown)—the difference is not statistically significant, and when teenage parenthood is analyzed by current age, there are no significant differences.

Conclusions

Simple cross-tabulations without multivariate controls suggest that desire for sterilization reversal is highest among women who are black, Hispanic or unmarried; have a low family income; receive Medicaid; and are sterilized before age 30. However, as we have indicated earlier, the data do not allow us to assess the intensity and persistence of these desires. If the results are to be believed, some 880,000 couples would like to have their sterilizations reversed, yet only about 21,000 such procedures take place each year (18,000 fallopian tube repairs and 3,000 reconstructions of the vas deferens in 1983).³ It is difficult to know whether only this small number of couples are sufficiently motivated to undergo the operation or whether there are other barriers, such as

insufficient knowledge or lack of funds, that prevent people from realizing their wishes.

Nevertheless, the amount of expressed desire for sterilization reversal is a matter of concern. Clearly, more research is needed to assess the strength and persistence of the desire for more children and sterilization reversal; to ascertain whether those who desire more children in fact regret their decisions to be sterilized, as has been assumed; and to understand why people change their minds. Providers of sterilization services should be aware that 10 percent or more of their patients may later regret their decisions.

Even if further research confirms the existence of a high level of regret, voluntary sterilization should not necessarily be discouraged. The disadvantages of sterilization must be weighed against the disadvantages of relying on other methods of contraception, which include higher rates of unintended pregnancy. If people were discouraged from being sterilized, it may well be that more couples would later regret not having been sterilized than now regret that they have had the operation. For example, low-income women appear to have one of the highest levels of sterilization regret. They also experience more unintended pregnancies and unwanted births than other women, and without sterilization, this tendency would probably be increased.

Although the expressed desire for more children or desire for sterilization reversal, as measured here, may be an overstatement of the true demand for reversal operations, it still reflects a substantial level of dissatisfaction with sterilization as a means of fertility control. It is possible that if more acceptable methods of reversible contraception were available, fewer women would resort to sterilization at young ages, and the level of sterilization regret would be much lower.

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*In 1982, the year of the survey, a family of four would be defined as falling within 150 percent of the federal poverty level if its income was \$14,793 or less. (See: U.S. Bureau of the Census, "Money Income and Poverty Status of Families and Persons in the United States, 1982," *Current Population Reports*, Series P-60, No. 140, 1983.)

Letters from Readers

Medicaid Expenditures for Newborns

The May-June issue of *Perspectives* [18:103, 1986] carried an important article on Medicaid expenditures for maternity care that policy-makers will certainly find useful. However, we would like to amplify one of the central conclusions contained in the article.

The authors discuss the cost to state Medicaid programs of furnishing neonatal intensive care (NIC) to newborns. On the basis of data from 13 states, they conclude that the proportion of Medicaid infants requiring neonatal intensive care averages 6.1 percent, which is relatively consistent with national estimates indicating that six percent of all newborns require intensive care. However, the authors admit that a "substantially greater percentage might have been expected in the Medicaid population, which is generally considered to be at high risk."

In our opinion, many states may have unintentionally supplied the authors with misleading information that understates the use of hospital services by Medicaid infants. Moreover, readers should not infer from the information published in the article that hospitalization costs for Medicaid infants are no greater than those for the infants of women who are not poor.

In the first place, the article does not indicate the precise definitions used by each state in deciding when an infant's hospitalization amounts to an NIC episode. If state Medicaid agencies include only hospital stays occurring at facilities bearing a formal NIC designation, then the number of infants reported to have received NIC services may be far lower than the number actually receiving hospital care during the neonatal period.

Such misleading tabulations may explain the low percentage of Medicaid infants reported to have received NIC services in Michigan (2.6 percent). In 1983, Michigan had the second highest percentage of non-white infants born at low birth weight (13.6

percent). In Florida, on the other hand, 11.8 percent of all nonwhite newborns were of low birth weight, and yet more than 20 percent of all Medicaid infants were reported to have received NIC services. While it is true that a larger proportion of Florida's Medicaid recipients are nonwhite (50 percent, compared with 35 percent in Michigan), this disparity cannot account for an NIC admission rate in Florida nearly eight times higher than that in Michigan.

Second, when comparing the use of hospital inpatient services by Medicaid infants with their use by other newborns, it is vital to look not only at the percentage of the population that receives such services but also at length of stay and readmission rates. Otherwise, estimates of inpatient hospital costs will be incomplete.

Lengths of stay in an NIC unit can vary dramatically according to the infant's birth weight. While an infant weighing five pounds may need only a few days in intensive care, one weighing 1.5 pounds can be hospitalized for two months. If the incidence of very low birth weight is higher among the infants of poor women, as several studies have suggested, then length of stay would most certainly have to be taken into account before cost comparisons could be drawn.

In addition, infants of very low birth weight run a greater risk of requiring rehospitalization during the first year of life than do heavier babies. If these costs are not taken into account, a considerable proportion of Medicaid expenditures by states may be overlooked.

In conclusion, we believe that the only accurate way to assess the hospital utilization levels of Medicaid infants is to document the number of hospital inpatient days used in a year by each infant Medicaid recipient or enrollee. To look only at services bearing the NIC label, and to overlook variations in length of stay and readmission rates, will lead to sizable underestimation of infant care costs for Medicaid babies.

Such underestimates will affect calculations of the cost-effectiveness of maternity care for pregnant women eligible for Medicaid. They also pose a real danger in times of growing capitation. As the article points out, substantial numbers of Medicaid recipients are being enrolled in capitated health plans. If these plans seriously underestimate the cost of serving pregnant women and their infants, severe underfunding may result, with an attendant diminution in the availability and quality of health care.

Sara Rosenbaum, Director, Child Health
Dana Hughes, Senior Health Specialist
Children's Defense Fund
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In the article "Medicaid Expenditures for Maternity and Newborn Care in America," by Asta Kenney, Aida Torres, Nancy Dittes and Jennifer Macias [18:103, 1986], the authors reported that 8.6 percent of deliveries in Mississippi in 1984-1985 were covered by Medicaid, for a total of 3,680 Medicaid births in the state. These figures are far lower than the estimates made from sample surveys carried out in Mississippi in 1982, 1983 and 1984, which indicated that in the first two years, 26.2 percent of births were covered by Medicaid (12,033 and 11,526 births, respectively), while in 1984, 27.4 percent (or 11,985 births) were covered.

We obtained these estimates from information on funding sources provided by 53 percent of all hospitals in the state. These hospitals account for 68 percent of all births in Mississippi hospitals. The figures for 1982 were independently verified by members of our staff carrying out a review of Medicaid data for the state. We believe that the higher estimates are the more accurate ones.

We have worked very hard in recent years to increase Medicaid eligibility and enrollment in our state. By including married women among those eligible (well before such a step was taken at the national level) and by raising the income level determining

eligibility to 50 percent of the poverty level, we added 2,000 pregnant women to the Medicaid rolls. The availability of accurate information aided us in this process. However, the estimates for Mississippi published in the *Perspectives* article confuse the picture.

Although, overall, the article provided some valuable information, the authors should exercise greater caution when publishing statewide data not based on more reliable estimates.

Alton B. Cobb

State Health Officer

Mississippi State Department of Health

The Authors Reply:

We agree with Sara Rosenbaum and Dana Hughes that the data presented in our article are by no means perfect. We explained in the article that research on services provided under Medicaid and on the numbers of persons receiving specified services is extraordinarily difficult to conduct, and that obtaining good data on neonatal intensive care is particularly problematic. Nevertheless, we are confident that our overall estimate—that 6.1 percent of Medicaid infants in the 13 states studied need neonatal intensive care—is based on the best data available, although the estimate is probably conservative.

We find the wide state-to-state variations in the incidence of Medicaid-funded neonatal intensive care quite plausible. Other studies have found considerable variations in the proportion of newborns requiring Medicaid-subsidized neonatal intensive care, and we think even wider variations are quite likely. Many factors could account for the wide ranges, including variations in state policies on Medicaid-subsidized neonatal intensive care, in definitions of neonatal intensive care, in the composition of the Medicaid populations, and in the ability of hospitals to obtain Medicaid reimbursement for a newborn infant when the mother—as often happens—doesn't apply for coverage for the infant. Another possible contributing factor is that support for neonatal intensive care units comes from funding sources other than Medicaid, which points up the fact that there are important public costs not paid by Medicaid. We would also point out that prematurity and very low birth weight are better indicators of neonatal intensive care than is low birth weight.

We concur with our critics that our article understates the long-term Medicaid costs resulting from neonatal intensive care. Our study focused only on pregnancy and the postpartum period, and did not seek to examine longer term costs. It might have been prudent, however, to include a sentence ac-

knowledging that future Medicaid expenditures for infants graduating from neonatal intensive care are likely to be higher than those for healthy newborns.

Our estimates of expenditures for neonatal intensive care did take into account the length of the infant's stay—so long as Medicaid was subsidizing it. When Medicaid ceased to pay, however (as often happens because of ceilings on the number of hospital days eligible for reimbursement), the infant's hospital stay was no longer in the province of our survey.

We think a study comparing inpatient service utilization by Medicaid and non-Medicaid infants, as discussed by Rosenbaum and Hughes, would be enormously valuable. The purpose of our study was simply to assess the number of women and infants obtaining Medicaid-subsidized maternity and newborn care and the public expenditures for such care.

We regret that the State of Mississippi did not furnish us with the information in Dr. Cobb's letter at the time of the survey. We included in our article all data given to us by the states, provided they seemed reasonable once the definitional issues had been resolved. However, had we been given the Mississippi data at that time, we would have been obliged to query some of the information, since it places Mississippi in the position of paying for a higher proportion of births under Medicaid than does any other state. This result is unexpected because even though Mississippi has a large poverty population, it does not have one of the broadest Medicaid programs in the country. We wonder whether the 53 percent of hospitals responding to the survey on funding sources for maternity patients overrepresented hospitals with large numbers of Medicaid births.

When a state did not furnish the number of Medicaid births, we made estimates on the basis of the most reliable data available to us. We recognize that our estimates are conservative, but we think they are reasonable. In two states for which we made estimates and that subsequently furnished us with data, we found that our estimates were very close to the number of reported Medicaid births in one state and were actually higher than the number reported in the other state. Accordingly, we find it hard to believe that our estimate is as much below the actual figure as the new Mississippi data would indicate.

Our methodology for making estimates was as follows: Based on data from the March 1985 Current Population Survey and the DHHS Health Care Financing Administration's Fiscal Year 1984 Standard Tables, we estimated the number of women aged 15–44 receiving Aid to Families with Dependent

Children and the number of those assessed as being "medically needy," by state. We then calculated, based on findings from the 1982 National Survey of Family Growth, that the birthrate among Medicaid recipients is 12 percent higher than the rate for all U.S. women. The 12 percent figure was applied to the state's overall fertility rate to estimate the birthrate among women on Medicaid and the number of births to Medicaid recipients.

Correction

In "The Effects of Sex Education on Adolescent Behavior" [18:162, 1986], by Deborah Anne Dawson, the second full sentence of column 2 on page 169 should have read as follows: Moreover, under the alternate assumption (that education always postdates coitus), contraceptive education exhibits no effect on initiation of intercourse at age 14.

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Books in Review

The Fragile Family

**The Divorce Revolution:
The Unexpected Social and Economic
Consequences for Women and
Children in America**

by Lenore J. Weitzman, Free Press, New York, 1985, \$19.95, 528 pp.

Reviewed by Arland Thornton

The revolution in divorce is a central feature of the continuing transformation of American family life. The divorce rate generally has been increasing since the middle of the 19th century, and during the 1960s and 1970s the increase was so extensive that projections of the proportion of marriages that would end in divorce reached 50 percent. This revolution in divorce cries out for an exploration of its causes, its consequences and its meaning for individuals and institutions. *The Divorce Revolution*, by Lenore J. Weitzman, makes a valuable contribution to this effort.

Weitzman's book places particular emphasis on California, the state where the first no-fault divorce law was enacted (in 1970). The author's research focuses on the effects this legal transformation has had on the men, women and children who have experienced divorce. In an extensive investigation conducted over a decade, Weitzman assembled information from the divorce court records of Los Angeles County in 1968, 1972 and 1977, and from the court records of San Francisco County in 1968 and 1972. In 1974 and 1975, she interviewed matrimonial lawyers and judges in those counties who were hearing divorce cases. In 1978, she conducted interviews with divorced people in Los Angeles; however, as I will detail later, the generalizability of the findings from the latter interviews is limited because of the relatively low proportion of the originally chosen sample that was actually interviewed.

Weitzman reports that the 1970 California

statute introduced six innovations that fundamentally altered the process and outcome of divorce: the abolition of all grounds for divorce except "irreconcilable differences"; the abolition of fault and the elimination of a moral framework focusing on guilt and innocence; the establishment of the ability of one spouse to unilaterally decide to divorce; the unlinking of the financial settlement from issues of guilt and innocence; the rejection of a sex-based division of labor and resources between husbands and wives and its replacement by a standard of equality; and the undermining of the old adversarial process and the development of procedures to enhance the potential for amicable divorce.

Although Weitzman recognizes some positive outcomes of these legal reforms, particularly in reducing the conflict associated with the divorce process, and although she argues against returning to the old system, her primary theme is that these innovations have weakened the bargaining position of women in the divorce process. Weitzman contends that the legal system now treats women and children less fairly and less generously than it once did, and that "the major economic result of the divorce law revolution is the systematic impoverishment of divorced women and their children" (p. xiv). In Weitzman's opinion, the primary difficulty with the new law is that it requires the equal treatment of husbands and wives before the law, when, in fact, gender-based division of labor within the family and the differential specialization and experience of each partner bring wives and husbands to the divorce court with unequal resources, opportunities and constraints. The result is serious inequities between divorcing women and men. Weitzman argues that in contrast to the new system, the old approach explicitly protected gender-based division of labor within the family and required the husband to continue to provide for his family after divorce.

Weitzman's data from the 1968-1977 California divorce records provide evidence that the outcome of divorce settlements has substantially changed as a result of the legal re-

form. In 1968, under the old system, most of the family's assets went to the wife in a majority of cases, but by 1977 there was an approximately equal division in the majority of the cases. Whereas the preponderance of the family's home equity was awarded to the wife in 61 percent of the 1968 Los Angeles cases, that proportion had dropped to 46 percent by 1977. In addition, the proportion of cases in which the family home was ordered sold as part of the divorce settlement increased from about one-tenth to about one-third. Similarly, in Los Angeles County, the proportion of alimony awards that were open-ended, rather than temporary or transitional, fell from approximately two-thirds to one-third between 1968 and 1972.

Weitzman's interviews with divorced people in Los Angeles County in 1978 help document the differential impact of divorce on men and women. On average, women and their children experience a substantial decline in their standard of living following divorce, while men's average standard of living actually rises after divorce. Weitzman concludes from her Los Angeles data that "one year after legal divorce, men experience a 42 percent improvement in their . . . standard of living, while women experience a 73 percent decline" (p. 339; emphasis in original).

Weitzman's estimates are emphasized throughout the book, and they have been accorded wide publicity in the press as reflecting a general pattern. For this reason, it is important to mention that the differential change Weitzman reports for Los Angeles is several times greater than the differential estimated from national data. Analyses of data from the Panel Study of Income Dynamics showed that over the seven-year period 1967-1973, the standard of living of women who divorced or separated at any point during that time declined by seven percent, while that of comparable men improved by 17 percent.¹ (These analyses led to the development of the methodology used by Weitzman in her work.) More recent estimates from the same study indicate that the income-to-needs ratio for divorced or sepa-

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rated women in the year following marital dissolution was nine percent lower than in the year before the marital dissolution, whereas for divorced or separated men, it was 13 percent higher.²

There are many possible explanations for these widely divergent estimates. For one, Weitzman focuses on divorce in Los Angeles in 1978 and uses retrospective reports of pre-divorce income, while the panel study produced current reports of income from a national sample of couples separating or divorcing between 1968 and 1975. Also relevant is the relatively low response rate in Weitzman's study: She was unable to locate nearly 50 percent of the divorced men and women who were originally chosen for the sample, and she was not able to interview 17 percent of those located. This rate of attrition introduces the potential for significant bias.

Because of the importance of this issue, further research is called for. In the meantime, I believe that the estimates derived from the national panel data are probably the most reliable. This observation, however, should not detract from the fact that all the estimates show that divorce affects men and women differently.

Although Weitzman's conclusions about the impact of divorce law reform on settlements and about the differential impact of divorce on men and women are well supported by empirical evidence, her claim that the "systematic impoverishment" of divorced women and their children is the major economic result of divorce law reform is not supported by her empirical data. To support this conclusion, one must go beyond the observations that the California reform changed the outcome of divorce settlements and that divorce currently impoverishes women and children. One must also show that the new law caused the standard of living of divorced women and their children to be lower than that of similar people under the old system. What is needed is a comparison of changes in the economic well-being of people who divorced before and after the new law was enacted—a comparison that Weitzman's research design does not permit. Without this longitudinal comparison, we can only observe that under the present system, divorce causes impoverishment of women and their children. However, we cannot draw any conclusions about how the economic impact of divorce may have been changed by the modification of the legal system.

I believe that when appropriate data are gathered and interpreted, we will find that the impact of divorce law reforms on the actual living standards of divorced women and their children has been smaller than is suggested by Weitzman. Although she some-

times points out that the old system of divorce may not have always protected divorced women and their children, the book as a whole seems to downplay the economic problems divorced women and their children experienced under that system. Divorce produced very negative economic results for women and children long before the legal reforms of the 1970s. The primary social, economic and legal factors that Weitzman and others argue are the basic causes of economic misfortune among divorced women and their children today were essentially in place before the reforms: Alimony was only awarded in a small minority of cases; alimony and child support awards were probably small and often were not paid; couples had few assets to divide; the most important assets (such as human capital, business goodwill, pensions and insurance) were not considered marital property to be divided; women were disadvantaged in the labor market, and they disproportionately faced the constraints and demands imposed by child-rearing. The new system and its impact on divorce settlements may have accentuated these preexisting negative factors, but I would be surprised if the actual living standards of divorced women and their children were substantially better before the divorce law reforms than they are today.

Nevertheless, I am sympathetic with Weitzman's concern that laws mandating equality may, under certain circumstances, actually produce inequality and inequity. Weitzman is probably correct when she argues that the equal treatment of wives and husbands in divorce proceedings is likely to produce inequity. Thus, it is possible that even if the old system had not itself impoverished women economically after divorce, the new system would have produced that outcome.

As I read *The Divorce Revolution*, I sometimes found myself distracted by the book's reliance on the mass media as its source of information about the family, and concerned about the accuracy of some of the facts presented. For example, on page 187, Weitzman states that "just 25 years ago, only four percent of the divorces involved couples married more than 15 years. Today, 20 percent of the divorces dissolve marriages of 15 years or more." Having just coauthored a paper showing the uniformity of the trends in divorce by marital duration,³ I was surprised by this statement. A footnote says that the source of this information is the *Wall Street Journal*; however, while the article in the *Journal* reported its source of data as a person from the Older Women's League, it did not provide a published document to consult. Using data from the *Vital Statistics of the*

United States,⁴ I estimated the proportion of all divorces occurring among people married 15 years or longer to have been about 18 percent in 1955, 21 percent in 1960 and 20 percent in 1981. Consequently, I am doubtful about the four percent figure for 25 years ago. Another example is Weitzman's report that Hoffman and Holmes found the standard of living of divorced or separated women to have declined by 29 percent. The original article gave a figure of seven percent.⁵

One crucial message of *The Divorce Revolution* is that the rise in divorce and its impact on women is modifying the institution of marriage, the structure of the family and the commitment of individuals to their kin. Now that women cannot place full confidence in marriage as a source of financial and emotional security, and now that they have more ways to support themselves economically outside the family, they may be less motivated to devote themselves primarily to childrearing and homemaking, and may be more motivated to invest in themselves, their careers and their capacity to earn money. As a result, women may be less willing to marry and to have children, and may be more able and willing to terminate an unsatisfactory marriage. In fact, many of the trends predicted by this line of reasoning have been documented by a growing body of research. However, we still need to conduct the research that demonstrates the causal connections among the various trends in family life.

In summary, *The Divorce Revolution* provides convincing new information about the way the reform of divorce law has influenced divorce settlements. It is also a major vehicle for publicizing the economic consequences of divorce for women and children. However, the book leaves many unanswered questions, and a substantial amount of research remains to be done concerning the causes and consequences of the divorce revolution.

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Whence the Decline?

Demographic Responses To Development: Sources of Declining Fertility in the Philippines

by Robert A. Hackenberg and Henry F. Magalit, Westview Press, Boulder, Colo., and London, 1985, \$22.00, 332 pp.

Reviewed by John E. Laing

Philippine fertility declined during the 1970s primarily as a result of changing marriage patterns and only slightly, if at all, as a result of contraceptive practice, according to this analysis of fertility trends in that country. The authors, whose affiliations include the Population Research Program at the University of Colorado, the Davao Research and Planning Foundation of the Philippines and the University of the Philippines, reach their conclusion chiefly by comparing total fertility rates (TFRs) and total marital fertility rates (TMFRs) from the 1973 National Demographic Survey (NDS) and the 1978 Area Fertility Survey (AFS). According to the 1973 NDS, the TFR for the five-year period from 1968 to 1972 (centered on 1970) was 5.89 children per woman of reproductive age. The 1978 AFS established a TFR of 4.66 for 1977, indicating a decline of 21 percent. Corresponding TMFRs were 9.63 and 9.22 per married woman of childbearing age, indicating a decline of only four percent.

The supposition here is that marital fertility has remained essentially unchanged while overall fertility has declined and that, therefore, the family planning program cannot be credited with more than a marginal contribution. There are several problems with this line of analysis, beginning with the noncomparability of the NDS and AFS data. The NDS was administered to a nationally representative sample, whereas the five regions covered by the 1978 AFS (one of a series of four fertility surveys conducted in selected regions of the Philippines between 1977 and 1980) represent only 44 percent of the national population.

The authors defend the treating of the AFS population as representative of the total population with a circular explanation that does not address the fundamental question of representativeness. They cite a report that has

not been formally published¹ as providing the basic justification for the use of the AFS regions as a national sample, then say that in an effort to add more precision, some elaborate weighting procedures were explored, "but the results did not differ substantially from the unweighted totals. To avoid the appearance of claiming additional significance for the results by statistical mystification, we decided to employ the unweighted all-region totals as proxies for national sample data in this report" (p. 18). The authors' stated concern about misleading the reader by using weighted data did not prevent them from mislabeling tables of AFS data as referring to the Philippines as a whole, or from extrapolating about national trends using this unrepresentative sample.

The reliance on AFS data for drawing nationwide conclusions is unnecessary, since nationally representative data were obtained in the Republic of the Philippines Fertility Survey (RPFS), also conducted in 1978. The book barely mentions the RPFS, and then only in the concluding chapter, where the authors cite RPFS data to demonstrate that the AFS findings are similar.

The findings from the AFS and the RPFS regarding 1977 TFRs and TMFRs are indeed similar, but they are by no means identical. According to the RPFS, the TFR declined to 4.96 in 1977, and the TMFR, to 9.10. These figures indicate a decline in the TFR between 1970 and 1977 of 16 percent, and a decline in the TMFR of six percent. Thus, they support the conclusion of a greater decline in the TFR than in the TMFR, but attribute a greater proportion of the fertility decline to changes in marital fertility than do the AFS findings. Even granting the similarity of the findings from the two surveys, the question remains: Why analyze national trends using AFS data?

The authors also pay insufficient attention to the question of the validity of making comparisons between 1977 fertility data and data from the five-year NDS period centered on 1970. Retrospective fertility data are susceptible to date misplacement biases during the years immediately preceding the survey. As a result, the most valid data from other surveys for comparison with the NDS figures are likely to be five-year averages centered on 1975. Thus calculated, the 1975 TFR from the AFS is 4.68 and from the RPFS, 5.20. In comparison with the 1970 NDS figure, this represents a decline of 21 and 12 percent, respectively. The 1975 TMFR is 8.54 according to the AFS and 8.86 as calculated from the RPFS data. This is a decline of 11 and eight percent, respectively. Even according to the AFS data, marital fertility accounts for more than half of the decline, and according

to the RPFS data, it accounts for two-thirds of the decline.

So the 1975 data, especially from the RPFS, seriously undermine the conjecture that marital fertility has remained essentially unchanged. If the apparent increase in marital fertility between 1975 and 1977 (indicated by both the AFS and the RPFS) is correct, it would indicate a decline in family planning program performance during the mid-1970s. But it would not negate the evidence of a substantial effect during the early 1970s.

Apart from the question of the internal validity of annual fertility trends based on retrospective survey data, there is reason to suspect upward bias in the total marital fertility rate as well. It has been consistently observed in fertility surveys in the Philippines that younger, recently married women have a tendency to identify themselves as single, apparently to avoid being interviewed about fertility-related matters. This practice is likely to bias marital fertility rates for younger women upward, since the women most likely to avoid being identified as married are those who do not yet have children. This bias is likely to affect rates for the year or two immediately preceding the survey much more than it does rates for earlier years.

Census data are not as greatly affected by this bias as survey data and can, therefore, be used to gauge the extent of underreporting of marriage. Data from the 1975 and 1980 censuses indicate that the proportion of women aged 15-19 who were married rose from 12 to 14 percent, and the proportion married among those aged 20-24 rose from 48 to 53 percent. The proportions reported married in these two age-groups were six percent and 41 percent, respectively, in the AFS, and seven percent and 39 percent in the RPFS. With differences of this magnitude, the age-specific marital fertility rates from either survey for these age-groups are likely to have been inflated as well. If so, the effect on the TMFR would have been disproportionate, since each age-group is weighted equally in TMFR calculation, whereas the numbers of married women in these age-groups are much lower than average.

The discussion of direct determinants of fertility does not mention two major proximate determinants, lactation and abortion, presumably because data are lacking. The authors derive the effects of age composition and marriage pattern on fertility by inference from the observed trends and differentials in these two variables. The relationship between contraceptive practice and fertility correlates current contraceptive prevalence with 1977 age-specific marital fertility rates for women aged 20-39. This analysis reveals consistently negative correlations between

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use of effective methods and TMFRs, averaging -0.42 . The fertility effects of the indirect determinants are studied by cross-classification with number of children ever born; the analysis is controlled for age. It reveals, as expected, that fertility is negatively associated with education, income, high-status occupations, other indicators of high socioeconomic status and residence in an extended household.

In the concluding chapter, the authors present a multivariate analysis of the effects of both direct and indirect variables on the number of children ever born. This exercise is marred by an attempt to include current family planning practice as an independent variable, despite this factor's obvious irrelevance to past childbearing. Since the couples most likely to practice contraception are those whose fertility has been high, current contraceptive practice is found to have a positive association with number of children ever born. The authors do not comment on the methodological shortcomings of this analysis, nor do they attempt to interpret the positive relationship, despite its inconsistency with the negative relationship previously found between use of effective methods and age-specific marital fertility.

A general lack of concern with methodological issues pervades the book and affects the quality of analysis and interpretation at several other points, too. For example, the authors give no information on the number of

survey respondents, although they cite the number of households sampled. Nor is there any information on the extent of sample loss, and how this problem was handled. Second, the authors find an increase of 1.9 years in the singulate mean age at marriage since 1970 (from 22.8 to 24.7) by comparing 1978 AFS data with 1970 census data. That this increase over seven years is nearly three times the increase during the 22 years from 1948 to 1970 should invite some concern that the finding is artifactual and due to the tendency to underreport marriage. However, the increase is given as fact, although comparison of the 1970 and 1980 census data indicates a net decline in the singulate mean age at marriage during the 1970s. Third, the authors attach considerable significance to data from the 1977 and 1978 rounds of the AFS that reveal a substantial increase between the two survey dates in the use of rhythm, withdrawal and abstinence. Though they admit that the increase may be due "in part" to a modification of the questionnaire between the two surveys, it is likely that nearly all of the increase is due to this change, which was made expressly to adjust for suspected underreporting of the use of these three methods. Furthermore, the authors state that the modification did not refer to the rhythm method, whereas in fact it did.

The findings presented in *Demographic Responses to Development* are not only methodologically flawed, but also out of date.

The RPFS country report was published in December 1979,² more than five years earlier than this analysis, and a volume of second-stage analysis was published in 1984.³ Since 1978, there have been two more rounds of the AFS, and final reports for each were written and circulated long ago in the Philippines. A new national demographic survey was conducted in 1983; a preliminary report from that survey was issued in March 1984.⁴

Consequently, there is little in this report that has not been superseded by new data and new analyses. It is sad to think that this book, because of its publication in the United States, will probably be more widely read than the more accurate, relevant and timely reports published in the Philippines.

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TRI-NORINYL® 21-Day Tablets (7 blue tablets of norethindrone 0.5 mg with ethinyl estradiol 0.035 mg, 9 green tablets of norethindrone 1.0 mg with ethinyl estradiol 0.035 mg, 5 blue tablets of norethindrone 0.5 mg with ethinyl estradiol 0.035 mg).

TRI-NORINYL® 28-Day Tablets (7 blue tablets of norethindrone 0.5 mg with ethinyl estradiol 0.035 mg, 9 green tablets of norethindrone 1.0 mg with ethinyl estradiol 0.035 mg, 5 blue tablets of norethindrone 0.5 mg with ethinyl estradiol 0.035 mg, 7 inert tablets).

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ORAL CONTRACEPTIVE (OC) AGENTS

Indications: Prevention of pregnancy. **DOSE-RELATED RISK OF THROMBOEMBOLISM:** Because studies have shown a positive correlation between OC use and risk of thromboembolism, it is prudent to minimize estrogen exposure. Prescribe an OC with the least amount of estrogen compatible with an acceptable pregnancy rate and patient acceptance. Start new users on OCs containing 0.05 mg or less of estrogen.

Contraindications: 1. Known or suspected pregnancy (see Warning a). 2. Thromboembolic or thrombotic disorders. 3. Past history of deep vein thrombophlebitis or thrombotic disorders. 4. Undiagnosed abnormal genital bleeding. 5. OCs should not be used by women who have had any of the following: a. cerebral vascular or coronary artery disease, including myocardial infarction; b. known or suspected carcinoma of the breast; c. known or suspected estrogen dependent neoplasia; d. benign or malignant liver tumor that developed during use of OCs or other estrogen containing products.

Warnings: Cigarette smoking increases the risk of serious cardiovascular side effects from OC use. This risk increases with age and with heavy smoking (15 or more cigarettes per day) and is quite marked in women over 30 years of age. Women who use OCs should be strongly advised not to smoke.

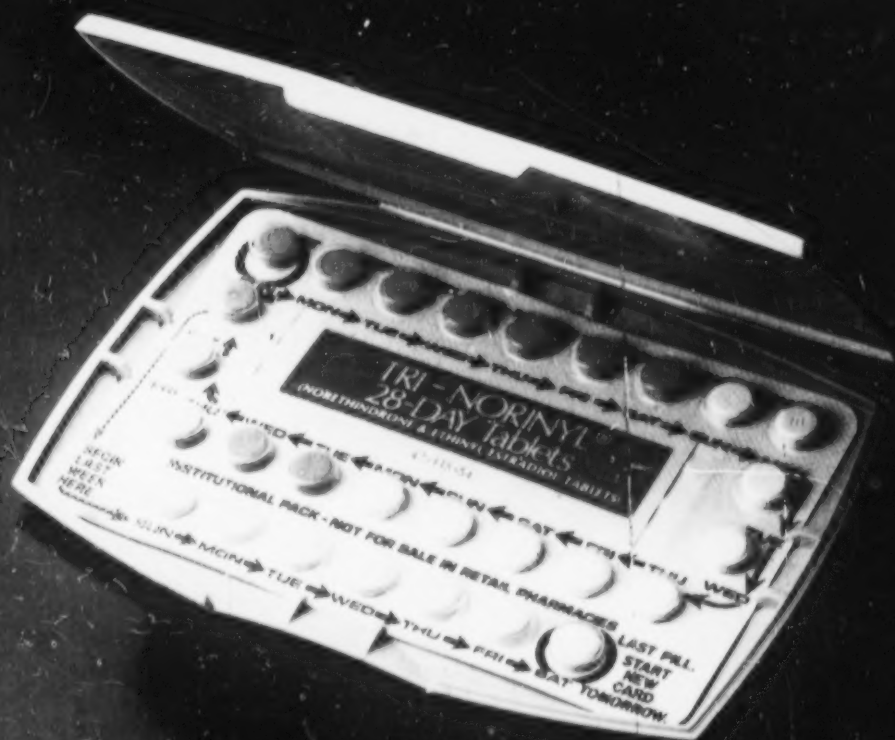
The use of OCs is associated with increased risk of several serious conditions including thromboembolism, stroke, myocardial infarction, liver tumor, gall bladder disease, visual disturbances, fetal abnormalities, and hypertension. Practitioners prescribing OCs should be familiar with the following information relating to these risks.

1. **Thromboembolic Disorders and Other Vascular Problems.** An increased risk of thromboembolic and thrombotic disease associated with OC use is established. One study demonstrated an increased relative risk for fatal venous thromboembolism and several studies demonstrated a risk for non-fatal venous thromboembolism. They estimate that OC users are 4-11 times more likely than nonusers to develop these diseases without evident cause. One British study reported an excess death rate of 40% in OC users, most of which resulted from cardiovascular disease. Another British study showed a lower death rate in OC users than controls; an increase in cardiovascular deaths was seen but was not statistically significant. A U.S. prospective study failed to disclose increased mortality rates from cardiovascular disorders, but a subset analysis of a retrospective case-control study showed significant increases in venous thromboembolism. CLER-BROVASCULAR DISORDERS. Two American studies demonstrated an increased relative risk for stroke not seen in prior British studies. In an American study of cerebrovascular disorders in women with and without predisposing causes, relative risk of hemorrhagic stroke was estimated as 2.0 times greater and thrombotic stroke as 4-9.5 times greater in users than nonusers. A British long-term follow-up study reported in 1975 a highly significant association between OC use and stroke. Another study had suggested an association in 1974, but the number of cases was too small to estimate the risk. Subarachnoid hemorrhage has been shown to be increased by OC use in British and American studies. Smoking also increases incidence of these accidents, smoking and pill use appear to increase risk more than either alone.

2. **MYOCARDIAL INFARCTION (MI).** Increased relative risk of MI associated with OC use has been reported. One British study found that the greater the number of underlying risk factors for coronary artery disease (cigarette smoking, hypertension, hypercholesterolemia, obesity, diabetes, history of previous MI, and/or other factors) the higher the risk of developing MI, regardless of OC use. OCs were an additional risk factor in terms of relative risk; it has been estimated that nonusers of OCs (smoking is considered a major predisposing condition to MI) are twice as likely to have a fatal MI as nonusers. In an American study of 18,000 women, there was a 1.5-fold increased risk of fatal infarction compared to non-smoking users, and a 10.2-fold increased risk compared to nonusers. The number of cigarettes smoked is important in determining the importance of these relative risks. Relative rates for various age groups must be considered. Estimates are based on British vital statistics which show age MI death rates 2-3 times less than in the U.S. so death rates could be higher. Risk of other predisposing conditions in determining relative and absolute risk has not been quantified. Other synergistic actions may exist. **RISK OF DISEASE.** Using data from several national adverse reaction reporting systems, British investigators concluded that risk of thromboembolism, including coronary of estrogen were associated with a higher risk of thromboembolism than those containing 0.05-0.08 mg but quantity of estrogen may not be the sole factor. This was supported by a U.S. study. A British study found a positive association between dose of progestin in estrogen and certain thrombotic disorders when higher estrogen preparations were no longer prescribed. Careful epidemiological studies to determine degree of thrombotic disease risk associated with progestin only OCs have not been done. Thromboembolism disease has been reported in women using these products, and they should not be considered free of excess risk. **PERSISTENCE OF RISK.** Two studies have suggested an increased risk may persist for 6 years after discontinuation of use for cerebrovascular disease and 9 years for MI. Another study suggested the persistence of risk for subarachnoid hemorrhage. **ESTIMATE OF EXCESS MORTALITY FROM CIRCULATORY DISEASES.** A large British prospective study estimated mortality rate per 100,000 women per year from circulatory diseases for OC users and nonusers according to age, smoking habits, and duration of use. The overall annual excess death rate for OC users was estimated to be 20-100,000 (ages 15-34) 5-10,000 (ages 35-44) 35-44 100,000 (ages 45-49) 140-100,000 (ages 50-54) 140-100,000 (ages 55-59) 140-100,000 (ages 60-64) 140-100,000 (ages 65-69) 140-100,000 (ages 70-74) 140-100,000 (ages 75-79) 140-100,000 (ages 80-84) 140-100,000 (ages 85-89) 140-100,000 (ages 90-94) 140-100,000 (ages 95-99) 140-100,000 (ages 100-104) 140-100,000 (ages 105-109) 140-100,000 (ages 110-114) 140-100,000 (ages 115-119) 140-100,000 (ages 120-124) 140-100,000 (ages 125-129) 140-100,000 (ages 130-134) 140-100,000 (ages 135-139) 140-100,000 (ages 140-144) 140-100,000 (ages 145-149) 140-100,000 (ages 150-154) 140-100,000 (ages 155-159) 140-100,000 (ages 160-164) 140-100,000 (ages 165-169) 140-100,000 (ages 170-174) 140-100,000 (ages 175-179) 140-100,000 (ages 180-184) 140-100,000 (ages 185-189) 140-100,000 (ages 190-194) 140-100,000 (ages 195-199) 140-100,000 (ages 200-204) 140-100,000 (ages 205-209) 140-100,000 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NORINYL 1+50
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